Middle managers' construing of exploitative and exploratory innovation projects in two large high-tech corporations

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ABSTRACT

This research examines middle-managers' construing of exploratory and exploitative innovation projects in two large US high-tech companies. The theoretical basis for this research is that of organizational ambidexterity and agency theory. Answering a call from multiple researchers, this research focuses on ambidexterity at the individual level.

The research follows a phenomenological paradigm with its focus on individual experiences as evidence, and constructivism as epistemological stance. It is based on a case study design, with data collection completed in two stages, using Repertory Grid Technique in stage 1 and Key Informant Interviews in stage 2.

Emergent findings indicate that a) prior experience type (exploitative/exploratory) and function (Engineering / Product management) are the key leading indicators of differences in the construing of project success; b) there is mostly alignment in how managers from different levels construe what is important for exploratory and exploitative innovation projects; c) there is a difference in the extent to which managers apply approaches to these two types of project; and d) managers rarely apply exploratory-innovation specific approaches even when merited.

The emergent root cause for lack of exploratory innovation specific approaches appears to be a result of inertia, and of the expectations of the extant corporate culture. A model is developed to indicate how a change can be introduced in an organization to address this finding.

This research contributes to study of ambidexterity, managerial sensemaking, and project management by offering an insight into how managers from the Product Management and Engineering functions think about project success. It offers possible explanations for the lack of distinction between exploration and exploitation when it comes to selection of approaches and metrics; it presents implications to practice and makes recommendations for improving chances of success of exploratory innovation projects.

"*Life can only be understood backwards;*

but it must be lived forwards."

-Søren Kierkegaard

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DECLARATION

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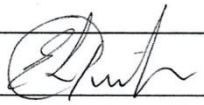
Signature of Candidate:		Date:	2 July 2020

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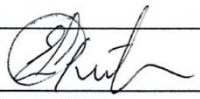
Signature of Individual Submitting:	
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Glossary of Terms

Term	Description
Ambidexterity	An organisational ability to explore and exploit at the same time (Raisch et al., 2009).
Agency theory	Describes discrepancy in expectations between principals and agents and proposes behaviour-based and outcome-based contracts to address said discrepancy (see Eisenhardt, 1989; Holmström, 1989).
Agile Methodology	Software development methodology that emphasizes frequent and incremental delivery of highest customer value (see Owens & Fernandez, 2014).
Balanced Scorecard	A planning and execution framework that companies use to communicate their plans, align the goals across the organisation, and prioritise and track project outcomes (Montgomery & Perry, 2011).
Construing	A process of interpreting events and ascribing meaning to them based on person's idiosyncratic experiences (Kelly, 1955, 1966).
Constructive Alternativism	Kelly's somewhat idiosyncratic expression of his philosophical position grounded in the belief that "*all of our present interpretations of the universe are subject to revision and replacement […and] there are always some alternative constructions available to choose among in dealing with the world."* (Kelly, 1963, p. 15).
Constructivism	Constructivism is an epistemology that postulates that knowledge of reality is a result of meanings ascribed by individuals as they explain events in a way that is useful to them (Raskin, 2002); knowledge as an invention consistent with evidence as personally experienced.

Constructionism	Constructionism is an epistemology that postulates that we invent beliefs based on social relationships, cultural contexts, linguistics and communication patterns (Raskin, 2002); knowledge as a social agreement about what counts as knowledge and as evidence.
Corporate Entrepreneurship	Term used to describe entrepreneurial activities in established companies.
Corporate Venture	"*an entrepreneurial initiative that originated within the corporate structure (or within an existing business of the corporation) and was intended from its inception as a new business for the corporation*" (Kuratko, Covin, & Garrett, 2009, p. 460).
Deliberate Strategy	A strategy formation process, whereby the realized strategy is also the intended strategy (Mintzberg & Waters, 1985).
Disruptive Innovation	Innovative product or service that eventually displaces established products often disrupting incumbents' market positions (Christensen, 1997).
Dynamic Capabilities	Dynamic capabilities are those that help companies address high demand current needs and anticipate future needs (Teece et al., 2016).
Emergent Strategy	A strategy formation process, whereby strategic patterns are realized despite the absence of specific intentions (Mintzberg & Waters, 1985).
Exploitation	Company's activity focused on increasing efficiency and productivity while minimizing risk (March, 1991).
Exploration	Company's activity focused on innovation through discovery while embracing risk (March, 1991).

Exploitative Innovation	Exploitative innovation refers to incremental improvement of core businesses. May also be referred to as sustaining or incremental.
Exploratory Innovation	Exploratory innovation refers to introduction of new products. May also be referred to as disruptive or radical.
Innovation Accounting	Set of metrics appropriate for early stage exploratory innovation projects, when traditional revenue-based metrics do not apply (Ries, 2017).
LHTC	Large High-Tech Corporation, typically larger than 2,500 employees (see Chandy & Tellis 2000).
Intrapreneurship	Term used to describe entrepreneurial activities in established companies. Also known as Corporate Entrepreneurship.
Metrics	"*Quantitative measures used to assess progress, uncover problems, and provide a basis for improving a process or product*" (Kossiakoff et al., 2011, p. 400).
Middle Managers	Managers throughout the organisational hierarchy from a lowest level supervisor to a Vice President but excluding an executive management team (Harding et al., 2014, p. 1214).
Personal Construct Theory	A theory of personality and cognition developed by George Kelly (see Kelly, 1995, 1996).
Principal-Agent Problem	A problem that arises from relationships such as employer-employee, and manager-subordinate, where principal is the former and the agent is the latter, and agents may not act in the interest of the principal (Eisenhardt, 1989).
Principal Component Analysis	A technique used to calculate the cognitive complexity of a person from responses collected in a single repertory grid (see Jankowicz, 2004).

Repertory Grid Technique	An interview technique designed to elicit participants' constructs with respect to an issue being investigated (Bell, R. in Fransella, 2003).
Sensemaking	"*The process through which individuals work to understand novel, unexpected, or confusing events*" (Maitlis & Christianson, 2014, p. 59).
Start-up Accelerator	A program for a cohort of early-stage start-ups. Participating start-ups receive mentorship, possibly a seed funding, and are guided towards a successful product launch.
Waterfall Methodology	An approach to software development and delivery, typically associated with a rigid sequence of activities: requirements, design, implementation, and quality assurance, followed by a single release to a customer (see Owens & Fernandez, 2014).

1. Introduction

This chapter describes what this study is set to achieve, including the organisational context and the rationale for the choice of the topic. A brief overview of the methodology sets the context for the chosen epistemology, methods and techniques, and introduces the case companies. The significance of this topic is clearly stated, specifically how it contributes to the business practice in addition to evolving the literature on ambidexterity, by studying how individual managers think about exploitative and exploratory projects with respect to practices involved in managing them and metrics used to measure outcomes of these projects. The chapter concludes with the thesis outline.

1.1. Research Aim and Objectives

The aim of this study is to learn how middle managers in two case companies construe exploitative and exploratory innovation projects with respect to metrics used to measure the expected outcomes and techniques used to manage these projects towards the desired outcomes. Metrics in this context are "*quantitative measures used to assess progress, uncover problems, and provide a basis for improving a process or product*" (Kossiakoff et al., 2011, p. 400).

To meet this aim, the following objectives have been set:

1. to establish how middle managers construe exploitative and exploratory innovation projects;
2. to examine differences in construing and choices of approaches between the two middle management levels: strategic and tactical.
3. to examine differences in construing and choices of approaches between the two middle management functions: Engineering and Product Management.

1.2. Rationale

1.2.1. Organisational Context and Rationale for the Aim

Company A is a multinational Fortune 1000 company founded in the late 80s and headquartered in the USA with multiple major sites in the US, UK, Ireland, India, and China. It provides productivity and networking solutions mainly to large enterprises in industries such as Financial and Healthcare. Over the course of its existence, Company A has organically developed and released several new products, but the majority of new product innovation it introduced to the market was acquisition based. With mergers and acquisitions (M&A) still being a prominent portion of its innovation strategy, Company A is looking to capitalise on its capabilities and intellectual property to extend its offerings organically through new product development. In the past decade, Company A has both established and dismantled various structures aimed at ramping up its innovation pace. These included a venture arm focused on investments in select start-ups, and the internal 'Labs' organisation primarily focused on R&D activities. At the moment the company is rebuilding its grassroots innovation muscle to boost the pace of organic new product development, sustain its leadership in a fairly mature market, and expand the addressable market by solving existing and new problems relying on recent technological advances.

The topic of corporate innovation has been a subject of the author's professional passion for the past several years. While working for Company A, the author has helped design and implement an initiative to help the company's employees start new businesses with at least $1M annual revenue each, inside or outside the company. This included a series of grassroots initiatives to educate employees on how to turn raw innovation ideas into business concepts, pitch them to executives, and eventually launch new products. Being in a leadership position in the B2B software product organisation has exposed the author to a variety of projects. Some projects could have been characterised as incremental feature development, while others were aimed at new product development.

It became apparent to the author that new product development has different characteristics than incremental feature development, mainly in terms of risk and uncertainty. Yet the approach taken by management at all levels to the development of new products did not seem all that different from that which was applied to the development of new features for existing products. Additionally, Company A was in a transition to become more outcome driven (rather than activity and output driven) with respect to its goals, and outcomes sought tended

to be indiscriminate of a project type, most likely to be appropriate to incremental innovation than to a new product development. The topic of differences between the two distinct types of project and the different approaches they demanded with respect to project management, goal setting, and metric selection became of interest to the author and prompted this research.

Organisational ambidexterity (Raisch et al., 2009) is a strategy helping organisations to make distinction between the two types of project and be more deliberate about (a) balancing the investments between the two, and (b) applying the appropriate techniques for each, became of interest to the author.

1.2.2. Rationale for Objectives

There is a strong relationship between cognition and action (Maitlis & Christianson, 2014), action and strategy (Narayanan et al., 2011), and strategy and performance (Thomas et al., 1993). Therefore, it is of clear significance to understand how managers construe the exploitative and exploratory projects and what approaches they associate with these projects.

The importance of metrics comes from the fact that metrics impact the behaviours of individuals and groups by aligning goals and actions with a company's objectives (see Hauser, & Zettelmeyer, 1997). Frameworks such as Balanced Scorecard (Mongomery & Perry, 2011) and Rhythm (Thean, 2014) became popular among practitioners for setting and tracking metrics and have proven to lead to superior performance in a number of sectors (Davis & Albright, 2004; Thean et al., 2017).

Incumbent firms have to innovate to survive in an environment where technological advances allow small and nimble start-ups to solve customer problems in novel and less expensive ways (Christensen, 1997). It's not just any innovation that is important, but what some scholars call disruptive innovation (Christensen, 1997) and radical innovation (Leifer et al., 2000), that a firm has to come up with occasionally to maintain its competitive advantage, lead the market, or create entirely new markets for its products. Conversely, incremental innovation is typically aimed at defending the core business, addressing the current customer needs, and is not enough to address the new and emerging customer needs, eventually leading to loss of market leadership (Christensen, 1997; Leifer et al., 2000; March, 1991).

Projects aimed at the creation of radical and disruptive innovations are called exploratory innovation projects, which differ from exploitative innovation projects that are typically

aimed at the creation of incremental innovation. Succeeding with exploratory innovation is tough – there are many ways to fail and success is rarely predictable (Christensen, 1997; Leifer et. al, 2000; Tushman, 1997). This is due to the fact that exploratory projects carry higher uncertainty than exploitative projects.

While both the top leadership team and the rank-and-file employees are often interested in pursuing projects that may lead to disruptive innovations, the initiatives often get blocked at the middle-management level, as middle managers are often risk-averse, and may be concerned, among other things, about the possible adverse effects to their careers should the project fail (Dutton et al., 1997; Reynolds, 2017; Sharma, 1999). The risks inherent in exploratory projects, and the misalignment between the interests of top management and those of middle-management present a classic principal-agent problem (Eisenhardt, 1989; Holmström, 1989). The discussion on risk aversion of the middle-management layer of the organisation is framed in context of the agency theory (Eisenhardt, 1989; Holmström, 1989). See the glossary for definitions of the principal-agent problem and the agency theory, as well as the discussion in section 2.2.4.3.

Even when an exploratory innovation project has commenced, there are many pitfalls in the intrapreneur's journey (see glossary for intrapreneur), and the results are highly unpredictable (Leifer et al., 2000). To increase the chances of success, companies should apply start-up like approaches (Cagan, 2017; Ries, 2017; Teece, 2016) with respect to execution and organisation, and set innovation-appropriate goals and metrics.

1.2.2.1. Start-up approaches

Lean Startup principles (see Blank, 2015; Ries, 2011, 2017) can help intrapreneurs stay on the right course through experimentation and rigorous testing of a solution's desirability, feasibility, and viability (Cagan, 2017). However, if managers resort to the project toolkit used for traditional projects, they may deliver something that customers won't need or won't be ready to pay for, inevitably leading to a project's failure (Cagan, 2017). This is exacerbated in large mature firms, where the typical experience of managers is with exploitative innovation projects requiring traditional project management techniques.

One of the techniques used to increase the chances of success of exploratory projects, is separating an exploratory innovation team from their originating functions. This way the

team resembles a small, fast moving start-up and does not have to adhere to the firm's policies and procedures as they move the project forward. For example, in a multiple-case study of exploratory innovation projects in large corporations, Edison et al. (2018) showed that permission to break rules at CallBook, and autonomy to make decisions and pivot at both CallBook and CallTech were key enablers of the innovation projects' success.

1.2.2.2. Goals and Metrics

The process of setting goals in itself is proven to increase a firm's performance (Bhatti et al., 2014; Davis & Albright, 2004; Kasie & Belay, 2013). Setting goals which are aligned with the objectives of an organisation (see Muller et al., 2005), with the metrics appropriate for the situation is proven to increase performance even more (Bhatti et al., 2014; Kasie & Belay, 2013).

It has been claimed by several scholars and practitioners that exploratory innovation projects require a different set of leadership and management techniques (see Cagan 2017; Baghai et al., 2000; Leifer et al., 2000; Teece, Peteraf, & Leih, 2016). Therefore, it is critical that goals and metrics for achieving these goals are set in a manner appropriate for these projects.

Goals and metrics setting are heavily dependent on managers' perceptions of project outcomes, and those perceptions differ from manager to manager, and depend on managers' prior experiences (Mcleod & Macdonell, 2010; Nooteboom, 2009; Pankratz & Basten, 2014). Hence, it is important to understand the construing (Kelly, 1966) of the situation by middle managers as it pertains to the project at hand, and the action these managers deem as appropriate as a result.

While traditional projects may include metrics around cost, scope, schedule, revenues, and even customer satisfaction, the exploratory innovation projects have to focus on addressing the risks around uncertainty with respect to desirability, feasibility, and viability. Consequently, customer and user traction metrics (ones that measure customer sign-ups, new users, returning users, and active users, as an example), sometimes referred to as Innovation Accounting (Ries, 2017), are more appropriate for these projects.

In companies where managers are mostly involved in traditional, exploitative innovation projects and traditional metrics are typically set, it is interesting to explore how these managers think about the exploratory innovation projects as they go about setting goals and

metrics for these projects. This is even more interesting to explore in companies that attempt ambidextrous behaviours as they balance the investment in exploitative and exploratory innovation projects, as in those companies, managers are likely to be switching context between the exploitation and the exploration. The literature on organisational ambidexterity (ability to exploit and explore at the same time) is highly relevant here (March, 1991; O'Reilly & Tushman, 2008; Raisch et al., 2009) and will set the context for the study as one of the main theoretical frameworks. Ambidexterity is considered to be aligned with the dynamic capabilities of the firm. While it is the ordinary capabilities that help companies exploit as they optimise their business operations, it is the dynamic capabilities that help organisations achieve their strategic goals and evolve and transform – themselves and the markets they operate in (Teece et al., 2016).

This study takes a broad view of the middle management layer – from a first line supervisor to a Vice President, excluding only an executive management team (see Harding et al., 2014, p. 1214), and will be discussed in more detail in section 2.2. This presents a unique opportunity to look at the various levels (Manager, Senior Manager, Director, VP) and the two functions: Engineering and Product Management, and determine any differences in how people at the various levels and functions construe the exploratory projects at hand, and how they chose techniques and metrics for those projects.

1.3. Methodology Overview

Perceptions the managers have about project outcomes differ from manager to manager and depend on managers' prior experiences (Mcleod & Macdonell, 2010; Nooteboom, 2009; Pankratz & Basten, 2014). With managers' perceptions being the focus of the study, a paradigm with constructivism as the underlying epistemology has been adopted. This research is set in the context of Personal Construct Theory (see Kelly, 1955). Kelly introduced the term 'Constructive alternativism' (see glossary) which deals with how people construe events and ascribe meaning to them (Kelly, 1955, 1966). Kelly has argued that different individuals ascribe different meanings to same events based on their own past history and experience of such events and that different forms of action are an outcome of these differences in construing.

Researchers looking to study perceptions, or personal constructs of people regarding a particular issue, often use Repertory Grid Technique (RGT). RGT (Bell, 2003; Fransella et

al., 2004; Jankowicz, 2004) is a particular interviewing technique that allows a researcher to elicit personal constructs on a particular issue from participants.

RGT (originally known as Role Construct Repertory Test) was developed by George Kelly, who presented the Personal Construct Theory (PCT) to the world of psychology in 1955.

A two-stage exploratory study was used to examine the construing of managers as they ascribe meaning to exploitative and exploratory innovation projects and their outcomes in the context of ambidexterity. Choice of approaches can be seen as actions that follow this construing of different project types.

In stage 1, the RGT technique was used to collect data that represents managers' construing of exploitative and exploratory projects from managers who led both type of projects. For the purpose of analysis, the managers were stratified into two groups: strategic (VPs, Sr. Directors) and tactical (Managers, Directors). A content analysis was performed on these constructs to compare how construing of projects by managers in the strategic group differed from that of managers in the tactical group.

In stage 2, a triangulation study was conducted to examine the findings of stage 1.

Two companies were selected to ensure that purposive sampling will result in a sufficient number of interviewees at different levels, to explore how differences in perceptions may map to the various middle management levels in the organisation.

Company A is the author's employer, where the author has a leadership position in the Product Management organisation and has led multiple innovation efforts. The author was fortunate to also gain access to Company B for this study. Both companies are multi-national high-tech corporations based in the US, founded almost 30 years ago, employ just under 10,000 employees each, and have revenues of around $3 billion each annually. Both companies are in a B2B market sell enterprise software and introduce new products to the market among a stream of incremental innovations.

1.4. Significance

This research draws on literature from three main realms: organisational ambidexterity, project management, and decision making, to extend findings of research made in the context of traditional project management to the context of new product development. The main

contribution to the literature on organisational ambidexterity is closing the gap on how middle managers construe exploratory innovation projects, and what approaches do they associate with these projects, as opposed to traditional projects. Such knowledge will contribute to the field of organisational theory, as individuals' sensemaking is considered key in understanding their actions and organisational change over time (Weick et al., 2005).

The research on traditional project management appears to be more mature than research on management of exploratory innovation projects and includes literature on project success perceptions. It can be argued, that a similar research on exploratory innovation in the context of ambidexterity has not yet achieved a similar depth of maturity. For example, a comprehensive literature review by Davis (2014), who focused on perceptions of project success, did not include sources on topics of innovation, ambidexterity, and corporate entrepreneurship. Similarly, a research by Pankratz & Basten (2013, 2017), who focused on managers' perceptions of project success does not seem to be replicated in the context of ambidexterity. This incomplete understanding may lead to inadequate techniques, metrics, and incentives around project outcomes, and to difficulty in choosing the most appropriate model of innovation metrics. It is also possible that middle-managers, especially the ones who have not led exploratory projects in the past, do not understand what exploratory projects entail, and the uncertainty and ambiguity inherent in these projects, and therefore missing the fact that these projects need to be managed differently (see Baghai, 2000). Ren & Guo (2011) found that in some organisations exploratory projects are presented as exploitative to top management to get attention. While they do not make this connection, it's sensible to assume that when a project is presented to senior management as exploitative, the expectations for project outcomes will be set accordingly. This may set the project up for failure because inappropriate expectations and metrics will measure its success. Ultimately, the choice of metrics that are not appropriate in particular circumstances may lead to suboptimal performance (see Locke et al., 2002).

The body of literature on ambidexterity is consistently growing, yet there is still much to be discovered (Raisch & Birkinshaw, 2008). With evidence that ambidexterity leads to increased company sales growth performance (He and Wong, 2004), it is important to understand the antecedents of successful pursuit and achievement of organisational ambidexterity. One of such antecedents is success metrics for outcomes of exploratory innovation projects. Project success has been a popular research topic for decades (Ika, 2009), and multiple researchers have explored perceptions of project success among various

groups of employees (Agarwal & Rathod, 2006; Davis, 2014; Fowler & Walsh, 1999; Pankratz & Basten, 2014; Pankratz & Basten, 2017).

In view of the above, understanding the managers' construing should be of interest to practitioners. It is hoped that practitioners in organisations pursuing organisational ambidexterity will know what to look for in terms of middle managers' understanding of what it means to undertake an exploratory project. Additionally, they might be able to assess the metrics system in place and adjust it to reflect the differences between exploitative and exploratory projects. While the research is set in context of mature corporations in the high-tech industry, it is sensible to assume that the findings will be of interest to practitioners in other industries and in companies of smaller sizes.

1.5. Thesis Outline

Chapter 2 reviews and integrates several literature fields and sets the research in the context of ambidexterity and the Personal Construct Theory as the main theoretical frameworks.

Chapter 3 introduces the research question, aims and objectives of the research, and gives a detailed account of methodology, including the epistemological stance, the method and techniques, and the sampling approach.

Chapter 4 presents the pilot study report.

Chapter 5 presents the main study findings.

Chapter 6 discusses the findings, implications for theory and for professional practice, and offers suggestions for further research.

2. Literature Review

2.1. Introduction

The purpose of a literature review is to integrate relevant thinking and research on the topic of a thesis, while offering a critical analysis of contending positions in extant literature and constructing an argument in support of research questions (see Merriam, 1998; Ritchie et al., 2014; Yin, 2017).

The review starts by introducing the topic of innovation and clarifying its definition in context of this thesis. Since the focus of this research is on innovation in large corporations, several relevant organisational designs are reviewed, such as corporate entrepreneurship and organisational ambidexterity. Antecedents of these designs and their impacts on a company's performance are discussed.

Middle managers' role is discussed with respect to innovation in general and ambidexterity in particular. The agency problem is presented as the central antecedent of the failed innovation initiatives, and various approaches to address the agency problem are discussed.

The overview of project outcomes and metrics follows and makes the distinction between traditional projects and innovation projects in the context of ambidexterity.

Finally, the psychology of managerial decision making is discussed, and Personal Construct Theory is introduced as the basis for the methodological justification for this thesis.

These themes are integrated in the literature synthesis presented at the end of the chapter, and the research questions, aim, and objectives are clearly positioned in the context of themes reviewed.

The figure below presents a high-level map to orient a reader with this chapter.

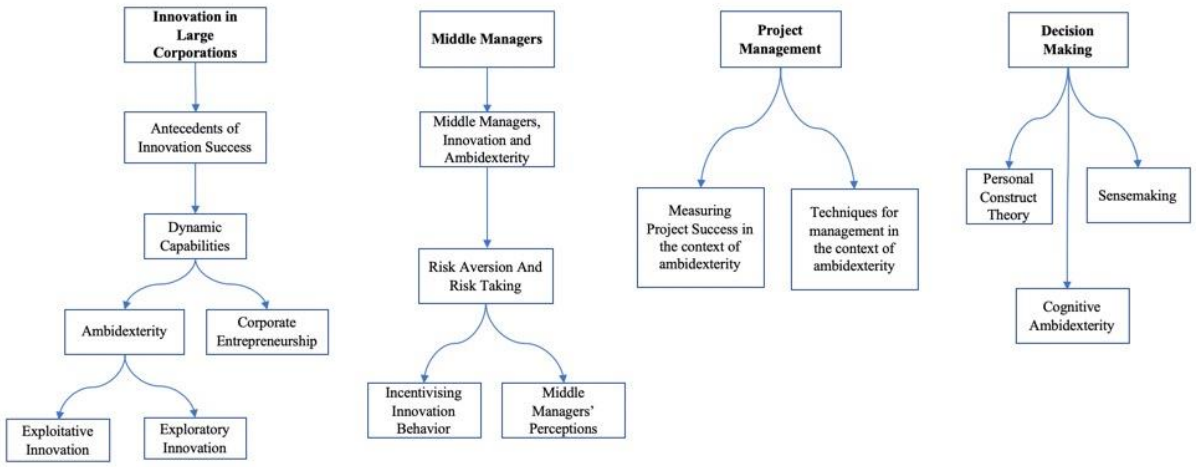


Figure 1. Literature Review chapter map.

2.2. Innovation in Large Corporations

2.2.1. Innovation

The definition of the term innovation has evolved over the past four decades. Early on, these definitions were overly centred on the business unit coming up with the new ideas and implementing them. No regard was given in these definitions to whether an innovation was new to the market (e.g. Damanpour, 1991; Damanpour, 1996; Tushman & Nadler, 1986; Van de Ven, 1986). Recently, these definitions evolved to underscore the value of innovations to markets adopting these innovations (e.g. Chang et al., 2012; Leifer et al., 2000; Poe & White, 2010), and to emphasise the importance of addressing customer and market needs (e.g. Greenhalgh & Rogers, 2010; Lockwood, 2009). The definition that in the author's opinion is the most appropriate in the context of this thesis is well articulated by Greenhalgh & Rogers (2010):

> "*A product innovation is the act of bringing something new to the marketplace that improves the range and quality of products on offer [and] an increased value […] added for the firm and also benefits to consumers and other firms*" (Greenhalgh & Rogers, 2010, p.3).

In the 1980s, mature companies saw a decline in capacity for new product innovation, due to the emphasis on quality and restructuring to bring down costs, while focusing on incremental innovation (Leifer et al., 2000). In the past three decades, we have seen innovation

opportunities created by advances in disruptive technologies, new business models, shifts in consumer behaviour, and cross-sector convergence (Macmillan & Prakash, 2017).

2.2.1.1. Types of Innovation

Greenhalgh & Rogers (2010) and Tushman & Nadler (1986) describe two types of innovation: product innovation and process innovation. Product innovation is about *what* a firm produces and can be incremental (added features or extensions to an existing product), synthetic (combination of existing components), or discontinuous (significant new technologies or product ideas). Process innovation on the other hand, is about *how* a firm goes about producing its products and services.

In his seminal work, Christensen (1997) introduced two types of innovation: sustaining and disruptive. In his view, sustaining innovation is focused on maintaining the current products and extending them with new functionality, while disruptive innovation is focused on introducing new products and services to the market, solving new problems, or solving existing problems in radically new ways. Leifer et al. (2000) have found that most leaders understand that distinction and realise that in order to survive they need to infuse disruptive innovation into the market, but at the same time few are able to execute on that realisation (see discussion in chapter 2.2.1.3 on antecedents of innovation failure and success).

Loewe et al. (2001) describe five types of innovation: (1) The Cauldron: most entrepreneurial in nature among the five, it capitalises on entrepreneurial spirit of the management team that challenges assumptions and reinvents business models; (2) The Spiral Staircase: continuous innovation within the core business inevitably leads to significant change to the business; (3) The Fertile Field: where managers find new ways to leverage company's competencies; (4) The PacMan: where companies invest in start-ups that proved market demand for their innovation; (5) The Explorer: a truly grassroots innovation, where the company is plunging into the unknown and anticipates a long and iterative project. Loewe et al. (2001) claim that choice of approach depends on where the company anticipates the biggest opportunities to be. Jacobs & Heracleous (2005) relied on this taxonomy in development of a conceptual model for strategic innovation.

Different types of innovation require different strategies, different leadership, and different management techniques to make these approaches work (Baghai et al., 2000; Christensen,

1997, 2013; Leifer et al., 2000; Loewe et al., 2001). For example, Leifer et al. (2000, p. 8) specify managerial capabilities such as uncertainty-mapping, and ability to follow a learning plan as critical for an exploratory project's success. McKenzie et al. (2009) claim that as managers advance in their careers and a strategic decision making is required in conditions of uncertainty (also typical for grassroots, exploratory innovation), the reliance on past experiences becomes detrimental, and more non-conventional thinking is required for these managers to succeed. Chapter 2.4 will discuss this topic in more detail.

Innovation does not always come in the form of a new product development. According to Macmillan & Prakash (2017), mergers and acquisitions (M&A) and corporate venturing (CV) are increasingly playing a bigger role in the overall innovation strategy. In 2016, companies have invested four times the funds into M&A driven innovation ($291B) vs. 2012 ($72B). In some sectors, like IoT and Robotics, M&A has constituted as high as 98% of investment vs. 2% investment in corporate venture funds (CVF). In other sectors like 'Digital and Social' and AI, the ratio is ~73% in M&A and ~27% is CVF. In other sectors M&A still constitutes more than 50% of investment vs. CVF.

2.2.1.2. Disruptive, Radical, Discontinuous, and Exploratory Innovation

Innovation that brings new products to the market, while leveraging new technologies to solve problems in better and cheaper ways, and at times creates entirely new markets while doing it, is critical to a company's survival (Bower & Christensen, 1995; Christensen, 1997, 2013; Christensen, Raynor, & McDonald, 2015; Leifer et al., 2000). However, an additional classification is helpful to distinguish various types of new product development.

Disruptive Innovation

The theory of disruption (Bower & Christensen, 1995; Christensen, 1997) describes a business environment where start-ups leverage new technologies to solve problems for the low-end of the market, and as the quality of their offerings increases, they go up-market and eventually gain mainstream adoption, therefore disrupting the established market leadership position of the incumbent (typically large and mature) firms.

Disruption theory became increasingly popular in academia, management practice, and consulting services since its introduction in 1995, and at times was seen as a silver-bullet approach to pre-empting disruption by new entrants and addressing market shifts by large

established firms (Christensen, Raynor, & McDonald, 2015). Unfortunately, this led to abuse of the term 'Disruptive Innovation', and a subsequent misunderstanding of its meaning (Christensen, Raynor, & McDonald, 2015). In essence, the term was being used liberally to refer to any new product development whether it followed the disruptive cycle or not.

Radical Innovation

Introduction of a new business or new product lines to the market based on new technologies by mature firms has been referred to as radical innovation (Ahuja, 2001; Leifer et al., 2000). Chandy & Tellis (1998) makes even further distinction, claiming that innovation is radical only if it has both a high degree of technology newness and a high degree of customer need fulfilment (see Table 1 below).

Table 1. Radical Innovation. Source: Chandy & Tellis (1998)

		Customer Need Fulfillment Per Dollar	
		Low	*High*
Newness of Technology	*Low*	Incremental Innovation	Market Breakthrough
	High	Technological Breakthrough	**Radical Innovation**

Ahuja et al. (2001) claim that organisations fall into several traps that prevent them from coming up with radical innovation. Mature firms tend to favour solutions that are familiar, mature, and relatively close to existing solutions, as these clearly lead to immediate benefits to the firm but tend to prevent break-through inventions that are key to firm's future performance. They suggest that by experimenting with technologies that are novel, emerging or pioneering, firms can avoid these traps.

While disruptive innovation is a process that follows a particular lifecycle as described above, radical innovation (Chang et al., 2012; Leifer et al., 2000) is a term used to distinguish an innovation activity aimed at new product development as opposed to incremental innovation whether in the context of a disruption scenario or in the context of normal course of business. Leifer et al. (2000) have acknowledged that radical innovation is synonymous to the exploratory innovation term used in the context of ambidexterity literature (see March, 1991; Raisch et al., 2009) and emphasised that managers need to possess exploratory innovation

competencies to succeed with radical innovation. Chang et al. (2012) emphasise that radical innovation is one that is new to a market rather than new to a firm. See section 2.2.3 on discussion about organisational ambidexterity.

Discontinuous Innovation

Discontinuous innovation (Tushman & Nadler, 1986) is not used as often in innovation literature, yet is truly synonymous (see Chang et al., 2012) to the definition of radical innovation by Leifer et al. (2000).

The term exploratory innovation is used most prominently in the remainder of this thesis to denote an innovation activity aimed at the development of new products or new businesses. This often involves new technologies, and characterised by uncertainties around desirability, feasibility, and viability of those new businesses and new products. At times these exploratory innovation projects may lead to radical innovations, and at times they may disrupt the incumbents, but at all times they have been initiated to explore new product innovation consistent with the definition by Greenhalgh & Rogers (2010, p.3) as presented in section 2.2.1 above.

2.2.1.3. Antecedents of Innovation Success and Failure

With innovation being an important organisational capability, researchers have been working on assessment models and innovation capability maturity models (e.g Gatignon et al., 2002; Saunila & Ukko, 2012; Sun et al., 2012) to help practitioners understand their organisation's current state of innovation capability and determine areas for improvement.

Determinants such as strategy, culture, support mechanisms, and innovation encouraging behaviour are responsible for either inhibiting creativity and innovation or promoting them (Büschgens et al., 2013; Cooper, 2019; Cooper et al., 2004; Hisrich & Kearney, 2004; Martins & Terblanche, 2003).

Barney (1986, p.657) offered a definition of culture as "*a complex set of values, beliefs, assumptions, and symbols that define the way in which a firm conducts its business*". He argued, that a distinctive culture can be a source of competitive advantage to a firm, a claim corroborated by Saffold (1988). Saffold (1988) expresses a commonly held view that the strength of a culture depends in part on the extent to which members share the underlying values. Drawing on the conventional definition of organizational culture as a set of

assumptions, beliefs, and values held by the organization (Barney, 1986; Schein, 2004), Büschgens et al. (2013) conducted a meta-analysis of literature on organizational culture impact on innovation. They found that while there are various different cultures that support innovation, hierarchical cultures are impeding innovation, while developmental cultures promote it. Developmental culture is one where individuals and teams give preference to growth and flexibility (Büschgens et al., 2013). Büschgens et al. (2013) offer additional cultural antecedents of innovation:

1. Organizational learning – an ability of an organization to adapt to changing conditions.
2. Organizational flexibility – encouragement and support for deviations from established processes.
3. A tolerance for risk – related to "organizational flexibility" mentioned above, indicates an organization's willingness to deal with uncertainty.

Büschgens et al. (2013) claim that cultures fostering results-orientation and adherence to extant rules and procedures, may be detrimental to innovation.

Naranjo-Valencia et al. (2011) have found that hierarchical cultures promote imitation, while adhocracies (cultures emphasizing growth, learning, and flexibility) promote innovation. Their findings are corroborated by Tian et al. (2018). Innovation is also supported by organizational cultures that promote and reward risk taking (Antoncic, 2003; Deal & Kennedy, 1982; Tian et al., 2018). Cooper et al. (2004) argued that organizational culture is one of the strongest drivers of new product development performance.

In a worldwide survey of small and large corporations, Quinn (1985) found multiple barriers to innovation including, among others: short time horizons, excessive rationalism, excessive bureaucracy, and inappropriate incentives. One common trait he found among the successful companies was the ability to recognise that early on in a project's life excessive planning is detrimental to the project, and some level of chaos will happen and is welcome. These successful companies set goals, select the right people, and define critical milestones, taking more of a venture capitalist investment approach. Quinn (1985) calls this 'chaos with guidelines'.

Capital markets lead to a risk-averse culture in large corporations: exploratory innovation is risky, unpredictable, idiosyncratic, and labour intensive (Holmström, 1989). Sharma (1999)

corroborates Holmström's point and describes the various challenges for exploratory innovation in large corporations. These include risk aversion, inertia, overwhelming volume of ideas, experienced leaders who might seem to be the most appropriate to lead innovation efforts are often also the ones with higher risk-aversion, and staffing: taking resources away from current commitments. Assink (2006) supports these views and claims that high risk and uncertainty about market success, track record of high rate of failure inhibit organisational adoption of ideas, and mismanagement of innovation projects leads to failed innovation efforts.

Recently, approaches like the Lean Startup (Ries, 2011, 2017) have brought more predictability, speed, and clarity of feedback to exploratory innovation to address high uncertainty and risk typically associated with exploratory innovation (Cooper, 2019). In particular, the Lean Startup approach allows entrepreneurs to deflect some of the perceived pre-requisites of new innovation success, such as insistence on having product requirements fully defined at the outset (e.g. Cooper, 1999). The iterative development approach, featuring experimentation and intensive customer interaction, has shown an evidence of being both feasible and viable in achieving results (Cooper, 2019).

Since the Lean Startup approach to exploratory product development was introduced in 2011 by Ries, large corporations have tried to adopt it to drive their radical innovation efforts with various degrees of success (Innovation Leader, 2016; Ries, 2017). Edison et al. (2018) have recently looked at several large firms and their experience with applying the Lean Startup approach to new product development. They reported several enabling and inhibiting factors for internal ventures adopting that approach. Among the enabling factors were (p. 81):

1. Explicit strategy of innovation;
2. Top management support and permission to break rules;
3. Having a project champion;
4. Access to internal networks and external networks (customers, partners);
5. Coaching, mentoring, training;
6. Cross functional teams with autonomy in decision making, including the ability to experiment and pivot.

In a survey of 117 large Taiwanese manufacturing firms, Chang et al. (2012) looked at share of sales and share of profits generated by radical innovations as a measure of radical innovations' long-term performance. They found four capabilities that were significantly and positively correlated with the radical innovations' performance: openness capability, integration capability, autonomy capability, and experimentation capability. Autonomy and experimentation in particular are some key innovation capabilities corroborated by other authors (e.g. Cagan, 2017; Owens & Fernandez, 2014; Ries, 2017).

Exploratory innovation projects often don't have the same legitimacy as exploitative innovation projects do in the eye of an organisation, and that legitimacy is important, because that what leads to resource allocation to a project (Leifer et al., 2000).

And so, given the high uncertainty associated with innovation programs and projects, it would appear that risk aversion can negatively influence the culture and support mechanism in an organisation, inhibiting the success of innovation programmes and projects. However, new approaches, such as the Lean Startup, can help manage the inherent risks in innovation programmes and projects and give legitimacy to them in the eyes of the organisation.

2.2.1.4. Company Size and Innovation

As corporations become larger, they put structures in place to help scale their businesses (Christensen, 1997; Tushman, 1997). Over time, these structures may lead to organisational inertia and perpetuate the old ways of doing things (Assink, 2006; Tushman, 1997). A dominant design in large organisations is one that perpetuates incremental innovation which builds on an organisation's current success (Assink, 2006). Failure to develop radical innovations in a timely manner puts mature firms at risk of being side-lined by start-ups (Christensen, 1997; Leifer et al., 2000). Baghai et al. (2000) have stressed that most incumbents and large companies decline with time, unless they find a way to innovate and grow, preparing new revenue streams as existing ones mature.

Chandy & Tellis (2000) challenge the common perception that radical innovations do not come from incumbents or from large firms. They point out the fact that most literature with such findings is based on small samples, and not on cross-sectional studies that would use large samples of products. They also challenge the sampling techniques used in some of these studies on grounds of using a convenience sampling vs. a more formal sampling

approach. Chandy & Tellis (2000) suggest that large firms have more opportunities to develop radical innovations thanks to significant financial and technological capabilities, which among other things, can help offset failures from some innovation initiatives. In the research that sought to address the above-mentioned methodological weaknesses, Chandy & Tellis (2000) were able to show that contrary to the common belief, the size of a firm is positively related to innovation outcomes. Number of employees was used as a determining factor of a firm's size in their research, where companies with more than 2,500 employees were considered large. Plambeck (2012) corroborates these findings and argues that higher levels of resources enable large companies to engage in more innovative product development.

Organisation size as an independent and moderating variable has been a popular topic of research (Møretrø, 2017). Similar to Chandy & Tellis (2000), Camisón-Zornoza et al. (2004) also point to contradictory findings among different scholars on the relationship between firm's size and innovation. They suggest that one explanation for the contradictory findings may be variability in methods used by these scholars. One such example is the issue of defining firm's size. According to Camisón-Zornoza et al. (2004), there is no agreement in literature on a single measure of firm's size: some use number of employees, while others use financial resources, and yet others use measures of input or output to denote firm's size. As it appears, this situation has not dramatically improved since Damanpour (1996) has pointed out a similar inconsistency in literature.

Innovation in large organisations remains a topic of interest among researchers, in part due to the contradictory findings mentioned by Chandy & Tellis (2000) and Camisón-Zornoza et al. (2004).

2.2.2. Corporate Entrepreneurship

Entrepreneurship phenomenon is often associated with start-up firms working on a new business idea. Increasingly, large and mature organisations find themselves in fast-changing business circumstances, and in order to survive have to learn new ways to respond to these business conditions – ways more often associated with start-ups (Hisrich & Kearney, 2014; Teece, 2016). Corporate Entrepreneurship (CE) got early attention in the 70s from management gurus such as Peter Drucker and Arnie Cooper. Then in the 90s it lost visibility, as independent rather than corporate entrepreneurship gained more focus. During the decline

of independent entrepreneurship in the wake of the dot-com bubble, CE started gaining visibility again in the beginning of the century (Katz & Shepherd, 2004).

Covin & Miles (1999) defined four forms of CE: sustained regeneration, organisational rejuvenation, strategic renewal, and domain redefinition. These forms may occur concurrently in a given organisation, and it is unlikely to determine ahead of time which form will lead to high performance. Sustained regeneration refers to the continuous introduction of new products and services or entry to new markets. Organisational rejuvenation refers to modifications an organisation applies to its structure, processes or capabilities to improve its competitive standing. Strategic renewal refers to modifications in a company's business model with respect to competition. Domain redefinition refers to the creation of new product-market arenas that have not been identified by others (Covin & Miles, 1999).

2.2.2.1. Characteristics of the Entrepreneurial Firm

Risk taking, innovation, and aggressive competitive action are the key characteristics of entrepreneurial companies (Antoncic, 2003; Zahra & Covin, 1995). Teece, Peteraf, & Leih (2016) draw an analogy between sports and companies operating under various degrees of uncertainty. Operating under certainty, they claim, is like playing chess: a largely predictable strategy with a decision tree. Conversely, operating under uncertainty is like mixed martial arts: the uncertainty is so high that significant agility is required. A key characteristic of organisational agility, they claim, is uncertainty management, which is very different from managing risk. In conditions of high uncertainty, applying entrepreneurial management techniques is more important than following established processes (Teece, Peteraf, & Leih, 2016). Firms that successfully apply entrepreneurial management when the business environment is calling for it are said to possess 'Dynamic Capabilities'. In their seminal work, Teece, Pisano, & Shuen (1997, p. 516) introduced dynamic capabilities as "*the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments*". Teece (2016) argues that dynamic capabilities are about doing the right things: these that help companies address high demand current needs and anticipate future needs; ordinary capabilities are about doing things right: lower level activities and skills to complete ongoing, clearly identified tasks.

Firms able to change in response to the fast-changing business environment under conditions of uncertainty have also been called 'learning organisations' (Argyris, 1977). Exhibiting this

ability is not easy. According to Argyris (1977), there are two types of learning organisations go through. Some organisations follow their policies and objectives as a matter of course (single-loop learning), whereas others question their policies or confront the basic assumptions in the process (double-loop learning).

2.2.2.2. Link Between CE and Performance

There is significant evidence in the literature that CE leads to superior firm performance (Covin & Miles, 1999; Kuratko, Ireland, & Hornsby, 2004). In a longitudinal study across three samples, Zahra & Covin (1995) found that CE had a positive impact on a company's financial performance which became more evident as more time passed. They also found that companies operating in 'hostile environments' benefit from CE more than those operating in 'benign environments'. The latter finding corroborates Stopford & Baden-Fuller (1994) conclusion that

> "*troubled firms in hostile environments can shed past behaviours, adopt policies fostering entrepreneurship and accumulate innovative recourse bundles that provide a platform on which industry leadership can be built*" (Stopford & Baden-Fuller 1994, p. 521).

An internal corporate venture is

> "*an entrepreneurial initiative that originated within the corporate structure (or within an existing business of the corporation) and was intended from its inception as a new business for the corporation*" (Kuratko, Covin, & Garrett, 2009, p. 460).

In a survey of 145 internal corporate ventures across 72 companies Kuratko, Covin, & Garrett (2009) found that CE had a positive impact on a company's performance, and that having clear goals and a clear value proposition early on had a positive correlation with the performance of a corporate venture. Authors recognised that even though it's hard to determine the exact outcomes of the venture ahead of time, the existence of clear goals separated the top performing ventures from the mediocre ones and from the underperforming ones. While their findings are consistent with the evidence presented in this chapter, there are some challenges to the approach Kuratko, Covin, & Garrett (2009) used in their study. While managers were asked to rate their venture as successful, marginal, unsuccessful, or

impossible to determine yet, the authors didn't explain what metrics were used to evaluate success.

2.2.2.3. Bridging CE, Lean Startup, and Dynamic Capabilities

In his ground-breaking book, Ries (2011) has built on the experimental method typically applied in sciences and engineering and developed an approach that can be applied by start-ups to succeed with their innovative ideas. Ries introduced a new framework called Lean Startup, where teams follow a 'build-measure-learn' cycle to evaluate the results of their decisions in a market-validated manner before moving on with development. The validation follows the experimental method, where start-ups identify their riskiest assumptions about desirability, feasibility, and viability of their business, develop hypotheses to test those assumptions, and design and run experiments to test the hypotheses.

Ries also introduced the concept of Minimum Viable Product (MVP), a minimum collection of features that lets the team test their riskiest assumptions. The idea of the framework is to accelerate the 'build-measure-learn' loop with the help of MVPs, to shorten the feedback loop between a start-up and a market. Prior to the Lean Startup school of thought, the reality was such that companies had to invest significant resources into an innovation project to fully build a new product before realizing whether it was an innovation or a mistake (e.g. Leifer & Rice, 2001; Van de Ven, 1986). Since Ries introduced the Lean Startup method in 2011, many large corporations have experimented with this approach in their internal corporate ventures (Innovation Leader, 2016; Owens & Fernandez, 2014; Ries, 2017) leading to such outcomes as making more evidence-based decisions, increasing speed of development, accelerating customer feedback, and development of a more entrepreneurial culture (Innovation Leader, 2016). Adoption of Lean Startup in companies is challenging when executives are looking for financial metrics and for a fast ROI. Additionally, moving to a truly validated learning was reported as a significant change management challenge (Innovation Leader, 2016).

Christensen (2013) builds on the Lean Startup approach and claims too that managers must validate critical assumptions about the business using discovery-driven planning. Discovery-driven planning is a disciplined approach to identify assumptions, plan to validate them, run experiments to validate them, and to learn and adjust (Cagan, 2017; Ries 2011, 2017). Teece (2016) supports this point by linking the Lean Startup and the dynamic capabilities

frameworks together, recognizing that approaches such as rapid experimentation and pivoting (changing the target market, problem to be solved, or solution) are key entrepreneurial techniques that help manage uncertainty in large corporations. Rapid experimentation may take a form of iterating on a product prototype with customers or writing a press-release and testing whether the customer is excited with a product that hasn't been built yet (see Ries, 2017).

It is worth mentioning that the dynamic capabilities framework was initially developed in the context of literature on corporate strategy and competitive advantage (see Teece et al., 1997). Later on, Teece (2014) has expanded the dynamic capabilities framework by including entrepreneurial management in said framework specifically to address the corporate strategy and competitive advantage of multinational enterprise firms.

2.2.3. Organisational Ambidexterity

Organisational research literature often describes challenges organisations face in attempt to pursue the various dualities, such as alignment vs. adaptability, and exploration vs. exploitation (Birkinshaw & Gupta, 2013). O'Reilly & Tushman (2008) describe exploitation as an activity of a company to pursue efficiency and increase productivity, while minimizing risk and variation. Conversely, they describe exploration as a company's pursuit of innovation through discovery, embracing risk and variation.

In context of this thesis, ambidexterity refers to an ability of a company to pursue both exploitation and exploration (O'Reilly & Tushman, 2008). The term traces back to Duncan (1976), who argued that for a successful outcome, firms pursuing ambidexterity need to have different structures to explore vs. execute.

According to March (1991), extensive focus on exploitation leads to sub-optimal long-term results and it is essential to balance exploration and exploitation. March (1991) suggested that both exploration and exploitation compete for the same resources, but risk and reward from each vary in timing and expected values. In search for the balance between the two, exploitation has the advantage of being more predictable, and has the speed and the clarity of feedback (March, 1991).

The bulk of ambidexterity literature focuses on new product development (e.g. Birkinshaw & Gupta, 2013; Gibson & Birkinshaw, 2004; Tushman et al., 2010), and one often overlooked

aspect is the market orientation and how that orientation relates to the innovative capabilities of the firm (Lisboa, Skarmeas, & Lages, 2011). In a survey among Portuguese firms, Lisboa et al. (2011) found that both customer and competitor market orientations are related to exploitative capabilities, as a firm tries to strengthen its position in the market, while only the customer orientation is associated with the exploratory capability. The focus on customer orientation for exploration makes sense as customer discovery is a precursor to coming up with truly innovative solutions (see Blank & Dorf, 2012; Cagan, 2017).

Andriopoulos & Lewis (2009) proposed a framework for describing the exploitation-exploration tension in organisations. The framework has three nested tensions: strategic intent (profit vs. breakthrough), customer orientation (tight vs. loose coupling), and personal drivers (discipline vs. passion). The first is usually evident at a firm level, the second at a project level, and the last one at an individual level. They suggested managing innovation paradoxes across these three levels to make ambidexterity more pervasive. Papachroni (2013) has evaluated how these tensions are experienced by the individuals themselves. She found that the individuals balanced these tensions based on their perceptions of the nature of said tensions, which typically were path-dependent for the individuals involved. This finding supports Nooteboom (2009), who argued that people's cognitive structures are path-dependent.

2.2.3.1. Organizing for Ambidexterity

Exploitation vs. exploration dyad has been the focus of scholars in the last few decades (see Christensen, 1997; Humble et al., 2015; March, 1991; Raisch & Birkinshaw, 2008; Tushman, 1997; Zacher & Rosig, 2015). While exploratory innovation is critical to sustain market leadership, few mature businesses succeed balancing the two (Sharma 1999; Tushman 1997) and are often disrupted by start-ups (Christensen, 1997).

Recognizing that ambidexterity is a viable alternative to a spin-out of an exploratory innovation project into a separate entity, researchers looked at whether and how exploitation and exploration can co-exist (see Andriopoulos & Lewis, 2009; Bonesso et al., 2014; He & Wong, 2004; Jansen et al., 2008; O'Reilly & Tushman, 2008; Papachroni, 2013; Raisch et al., 2009; Zacher & Rosig, 2015).

Cummings & Worley (2008) argue that it is the rapid technological and environmental changes that lead organisations to reinvent themselves and organize into leaner structures. They build on work of Lawrence & Lorsch (1967) and define 'differentiation' as the extent to which organizational design differs between the different business sub-units, and 'integration' as a set of mechanisms used by the organization to coordinate the work across sub-units. According to Cummings & Worley (2008), the need for integration increases as uncertainty in the environment and differentiation increase.

Ambidexterity scholars also build on Lawrence & Lorsch (1967) and evolve the concept of differentiation vs. integration further. One group of ambidexterity researchers advocates 'structural differentiation', whereby exploration and exploitation activities are performed by different business units (see Christiansen, 1997; Jansen et al., 2009b). In his seminal work, Christensen (1997) proposes that to achieve disruptive innovation, exploratory businesses are best kept separated from core businesses. Christensen's work came under fire from several critics (e.g. Lepore, 2014; Thomson, 2013) who challenged Christensen's definition of success, his samples being small, and his model being built on consumer buying decisions rather than those of businesses. Leifer et al. (2000) have also argued for the separation of an exploratory innovation project from the main business structure as a viable approach, but in their view a firm should spin-out a business (establish a separate business entity) working on a radical innovation when that innovation does not fit the firm's strategic context, rather than merely base the decision on the fact that the team is working on a radical innovation. Christensen himself has recognised that a spin-out may not be the only adequate approach and suggested that new ways need to be considered to solve the innovators dilemma (see Christensen, 2013).

Another group advocates 'integration' as a set of behavioural mechanisms that allow for exploitation and exploration activities in the same business unit (see Gibson & Birkenshaw, 2004; Jansen et al., 2009b; Lubatkin et al., 2006). Gibson & Birkinshaw (2004) introduced a concept of contextual ambidexterity (as opposed to structural), which is "*the behavioral capacity to simultaneously demonstrate alignment and adaptability*" (Gibson & Birkinshaw, 2004, p. 209). They claimed that contextual ambidexterity is enabled not by dual structures but by a collection of systems and processes facilitating and enabling ambidexterity. While Jansen et al. (2009b) fall into the former group, their view is that a high degree of integration is required through informal social integration by senior team, and through formal corporate integration mechanisms, even if the approach taken is that of differentiation.

2.2.3.2. Ambidexterity as a Strategy

While some academics and practitioners are calling for ambidexterity as a deliberate strategy with supporting culture and structures that may help solve the innovators dilemma by increasing visibility of trade-offs and resource allocation (see O'Reilly & Tushman, 2008; Pisano, 2015; Ries, 2017; Saleh & Wang, 1993), the strategy is not always deliberate. Mintzberg & Waters (1985) discuss various ways the strategy is formed in organizations, positioning these ways on a continuum between what they call 'deliberate' strategy and 'emergent' strategy (see glossary). In their view, strategy formation rarely falls into these extremes, and is often influenced by the environment the firm operates in, a stance corroborated by MacLennan (2009) and Nag, Hambrick, & Chen (2007).

O'Reilly & Tushman (2008) describe ambidexterity as a dynamic capability of the firm (see Teece et al., 1997) and put forward several propositions, based on an extensive literature review:

Proposition 1: "*The presence of a compelling strategic intent that justifies the importance of both exploitation and exploration increases the likelihood of ambidexterity*" (p. 197);

Proposition 2: "*The articulation of a common vision and values that provide for a common identity increases the likelihood of ambidexterity*" (p. 197);

Proposition 3: "*A clear consensus among the senior team about the unit's strategy, relentless communication of this strategy, and a common-fate incentive system increases the likelihood of ambidexterity*" (p. 198);

Proposition 5: "*Separately aligned organisational architectures (business models, competencies, incentives, metrics, and cultures) for explore and exploit subunits, and targeted integration increase the likelihood of successful ambidexterity*" (p. 198);

Proposition 6: "*Senior leadership that tolerates the contradictions of multiple alignments and is able to resolve the tensions that ensue increases the likelihood of ambidexterity*" (p. 199).

Ambidexterity scholars Gibson & Birkinshaw (2004) and Birkinshaw et al. (2016) emphasize that ambidexterity strategy formation is contextual to the firm, influenced by the environment it operates in. In their view, firms should not be trying to adopt some generic set of dynamic capabilities to become successful (Birkinshaw et al., 2016). Bridging ambidexterity and dynamic capabilities, they claimed that

"*the challenge for the firm is to make a choice that is appropriate to its environmental context and organisational heritage, and to develop the complementary set of capabilities that enable it to be effective*" (Birkinshaw et al., 2016, p. 55).

2.2.3.3. Ambidexterity and Performance

Ambidextrous organisations maintaining different cultures, processes and structures that support both the incremental and radical innovations lead in the market (Raisch et al., 2009; Tushman, 1997). Tushman (1997) takes a strong view and claims that organisations have to become ambidextrous, because otherwise they bound to continue responding to market threats with incremental process and product innovation risking their market position (Tushman, 1997). Ambidextrous designs were found to be more effective for innovation outcomes than non-ambidextrous ones, including a spin-out design, where a new corporate entity is established to drive the innovation project (Tushman et al., 2010). Companies switching to ambidextrous designs saw more positive innovation outcomes (Tushman et al., 2010).

While the evidence pointing at a positive impact of ambidexterity on performance is mounting (see Gibson & Birkinshaw, 2004; He & Wong, 2004; Luger, Raisch, & Schimmer, 2018; Pertusa-Ortega & Molina-Azorín, 2018; Solís-Molinaa et al., 2018; Tushman et al., 2010), there are challenges with some measurement methods employed by the various researchers.

Luger, Raisch, & Schimmer (2018) looked at 81 insurance firms over a 15-year period. They found that impact of ambidexterity on performance depends on the environmental context the company operates in, leading to fluctuations in performance outcomes. One challenge with their methodology was how content analysis of press releases was done for identifying type of innovation produced by the firms in the study. As Luger, Raisch, & Schimmer (2018) indicate, companies might have withheld information about exploratory activities from public press releases. Gibson & Birkinshaw (2004) have found a similar impact of business context on performance outcomes in a survey of 4,195 individuals across 41 business units.

In a survey of 206 manufacturing firms, He & Wong (2004) found ambidexterity to have a positive effect on a company's sales growth performance. Pertusa-Ortega & Molina-Azorín (2018) have surveyed CEOs of large Spanish manufacturing and service companies. They

found a positive impact of ambidexterity on several performance indicators, from sales growth to market share growth to profits. Similar to He & Wong (2004) they relied on self-reported results.

In a survey of 281 manufacturing companies Solís-Molinaa et al. (2018) have looked at how the absorptive capacity of a firm (ability of an organisation to absorb new external information, assimilate it and make changes to strategy) as a moderating variable impacts the ambidexterity outcomes. They found that ambidexterity has greater performance outcomes when absorptive capacity is at higher levels. Solís-Molinaa et al. (2018) have controlled for bias and triangulated (see Yin, 2017) financial and non-financial performance measures to increase the validity of their findings.

The table below summarises the key findings presented so far with respect to ambidexterity and its impact on a company's performance.

Table 2. Ambidexterity and Performance. Source: Author.

Author	Method	Performance Impact Findings
He & Wong (2004)	Survey	Sales growth increase
Gibson & Birkinshaw (2004)	Mixed (Interviews, Survey)	Satisfaction with the business unit performance over the course of 5-year period Performance outcomes depend on the business environment context
Luger, Raisch, & Schimmer (2018)	Multiple-Case Study	Performance outcomes depend on the business environment context
Pertusa-Ortega & Molina-Azorín (2018)	Survey	Sales growth, market share growth, profits growth
Solís-Molinaa et al. (2018)	Survey	Performance outcomes are mediated by absorptive capacity

2.2.4. Summary

This thesis focuses on product innovation that is new to the market and brings added value to that market and the company developing said innovation.

The terminology used to define various types of innovation is not always clear and often terms are used too liberally, without regard to the theories and nuances behind these terms. This is the case for term 'Disruptive Innovation', that typically will be radical in that it will be new to the market and will be technologically new, but in order to be called 'disruptive' it has to follow the disruptive innovation cycle.

For innovation to succeed in a company, certain conditions need to be present in the company's internal environment: its strategy, culture, and support mechanisms need to foster innovation. Many companies don't have the most appropriate ingredients to foster innovation, typically due to risk aversion associated with initiatives of high uncertainty, and inertia perpetuating processes that got the company where it is today.

Entrepreneurial approaches such as the Lean Startup and venture capital investment models help organisations cope with uncertainty, and contain investments, helping to address the risk-aversion challenges, while shortening the investment timeframes and allowing for ambiguity in requirements.

Company size as a determinant of innovation success remains a topic of interest for scholars, as the evidence of its impact on innovation and the associated performance is inconclusive.

Corporate Entrepreneurship, sometimes referred to as Intrapreneurship, is a phenomenon that describes project teams in established companies who apply start-up-like approaches to bring new product innovations to the market. There is clear evidence that corporate entrepreneurship leads to positive performance outcomes in large corporations.

Ambidexterity has emerged as a paradigm dealing with organisational designs supporting both exploitative and exploratory innovation. It has proven to have a significant positive impact on a company's performance, at times the outcomes depending on a business context a company operates in.

Both corporate entrepreneurship and ambidexterity are considered dynamic capabilities of the firm, which, contrary to ordinary capabilities, help organisations achieve their strategic goals, evolve and transform.

This thesis is positioned in the context of organisational ambidexterity with its exploitation-exploration dyad, as perceptions of managers about exploratory innovation (as opposed to exploitative innovation) are in the focus of this research.

The next section will focus on the middle-management layer of an organisation and its criticality to the success of ambidexterity and exploratory innovation.

2.3. Middle Managers

2.3.1. Defining the Middle Manager

This thesis focuses on middle managers from Product Management and Engineering functions in two multi-national software companies, as they are instrumental for innovation success in an organization, as will be described in section 2.3.3, and summarized in table 4.

For the discussion that follows this thesis adopts a management hierarchy typical for large multi-national software companies, especially ones headquartered in the US.

Table 3. Management Hierarchy in Large Software Companies. Source: Author.

Level Group	Level Name	Typical Role
Board of Directors	Director	Member, Board of Directors
Top Management	Executive Team	CEO, CIO, CTO, CPO, SVP of Product/Engineering, GM
Middle Management	Vice President	VP of Product/Engineering
	Senior Director	Sr. Director of Product/Engineering
	Director	Director of Product/Engineering
	Senior Manager	Sr. Manager of Product/Engineering
	Manager	Manager of Product/Engineering

This level grouping spans managers throughout the organisational hierarchy from the lowest level supervisor to a Vice President but excludes an executive management team. This stance is consistent with Mintzberg (1989, p. 98), who positions middle managers '*between the operating core and the apex*', and with Harding et al. (2014), who cites multiple sources in support of this view and concludes that there is a consensus in definition of middle manager.

There is some inconsistency in the terminology used in organisational literature when it comes to executive teams. Terms like Top Management Team (TMT) (e.g. Cao, Simsek, & Zhang, 2010; Plambeck, 2012), and Senior Managers (SM) (e.g. Christensen, 2013;

Holmström, 1989; Rouleau & Balogun, 2007) are used interchangeably. The term TMT will be used throughout the thesis to refer to this group and differentiate it from senior managers in the middle management group.

2.3.2. Role of the Middle Manager

Predictions made in the 50s through the mid 80s on the future role of middle management anticipated the role of middle managers becoming less crucial, more automated and routine, eventually leading to shrinking the number of middle managers (see Dickson, 1977; Torrington & Weightman, 1982). Conversely, research made in the late 80s has shown that information technology led to evolution of the middle management's role rather than decline in its ranks (see Dopson & Stewart, 1990). In eight case studies with organisations across industries, Dopson & Stewart (1990) found that middle managers had greater responsibility and wider scope of control. Managers in their sample have seen increasing and diversified challenges their jobs evolved to handle. Increased pressures and workload have been cited by many managers as a common complaint. Huy (2011) corroborates these findings in his study, and similar to Dopson & Stewart (1990) claims that the role of middle managers during times of change becomes more critical, and middle managers are increasingly rising up to the challenge.

Middle management is a link between the company's leaders and the rank-and-file employees (Burgess, 2013; Huy, 2001; Reynolds, 2017). Managers translate a strategy into achievable objectives and communicate performance metrics that make it clear to everyone in the organisation how success will be measured (Harding et al., 2014; Melnyk et al., 2004; Rouleau & Balogun, 2007).

Teece (2016) sees management as filling three main roles in organisation (p. 207):

1. Entrepreneurial management: responsible for seeking new opportunities, and to shift resources and organisational focus in response to market shifts.

2. Leadership: required for sharing and executing the strategic vision.

3. Operational management: focused on execution of the current plans.

The entrepreneurial management function in his view is also responsible for validation of hypotheses with data, to reveal new business opportunities. Ries (2017) also proposes for organisations to instantiate the entrepreneurial function.

2.3.3. Middle Managers and Innovation

Middle management plays a key role in identifying new ideas, finding and allocating resources to implement these ideas (Dutton et al., 1997), and leading successful exploratory innovation projects (Damanpour & Schneider, 2006). Typically, it is managers from the Product Management and Engineering functions, who are responsible for developing the ideas and bringing them to the market (see Cagan, 2017; Owens & Fernandez, 2014). These managers often operate in what Cummings & Worley (2008, p. 319) call 'Matrix Organization', where people assigned to projects may be a part of multiple reporting structures at the same time (e.g. one functional and one project-based). In their view, matrix organization structure is appropriate for complex projects with significant amount of uncertainty. The matrix organization may exacerbate the challenges surfaced by the agency problem (see section 2.3.4.3), because the conflict of interest between the different levels in an organization may span different hierarchies in a matrix organization.

Each management level has a role to play in innovation success with a particular set of behaviours (Kuratko, Ireland, & Hornsby, 2004; Miller & Camp, 1985). For example, TMT needs to be personally involved in disruptive innovation projects (Amabile & Pratt, 2016; Christensen, 2013).

Multiple leadership behaviours such as giving rewards, and providing recognition and resources are positively associated with employees' innovative behaviour (De Jong & Hartog, 2007). For middle managers to engage in entrepreneurial activity, an appropriate use of rewards, TMT support, resource availability, encouragement of risk taking, and tolerance to failure have to be present in the corporate environment those managers operate in (Kuratko, Ireland, & Hornsby, 2004). Taken to the extreme, natural tendency of corporate entrepreneurs to break rules (see Edison et al., 2018) may lead to ethical challenges, and firms should consider including an ethical component in their innovation frameworks and trainings (Kuratko & Goldsby, 2004).

Burgess (2013) claims that middle managers execute TMTs decisions, and identifies three roles managers typically fulfil in the context of corporate entrepreneurship (p. 194):

1. Innovator. In this role, managers introduce innovation processes and encourage idea generation. They are typically an expert in their area, which helps them identify business opportunities and pitch them to TMT.

2. Risk Taker. In this role, managers are ready to take risks, as well as feel empowered to take risks. They establish a culture in which failure is tolerated, so their teams have support to innovate without fear of consequences of failed innovation projects. Risk-taking is important at both the individual and organisational level (Antoncic, 2003) and this will be discussed in more detail in section 2.3.4 below.

3. Facilitator. In this role, managers facilitate interaction between employees at the operational levels and TMT. They learn from others and promote learning across the organisation.

Middle-managers can focus on a limited number of initiatives, and the focus depends on the type of organisation, and the predictability of their planning and execution process (Ren & Guo, 2011). In their empirical study, Ren & Guo (2011) found that in organisations pursuing new markets and offerings, exploratory projects are more likely to get noticed and sponsored, while in organisations focused on core business the attention is on exploitative projects. They also found that in organisations with patterned meeting and planning and execution schedules, exploratory projects are likely to be presented as exploitative to the top management.

Leaders are often the ones who stand in the way of exploratory innovation (Reynolds, 2017; Sharma, 1999). Reynolds (2017) calls the middle management layer in an organisation “the frozen middle” due to their risk and change aversion that often leads to change initiatives being blocked. Byrnes (2005) was the one who popularised the term “the frozen middle” that described how one automotive company’s executives were referring to the middle management, where all initiatives senior leadership came up with got "stuck" with the middle managers. This was attributed to unwillingness and inability of the middle management to execute on these strategic initiatives.

In a six-year study of middle managers in organisations undergoing a radical change, Huy (2001) found that middle managers were the ones who drove change, and (1) generated

entrepreneurial ideas, (2) leveraged informal networks better than TMT, (3) maintained momentum of change initiatives, and (4) managed tensions between change and continuity Huy (2001). In his opinion, middle managers possess key characteristics and abilities that make them effective in managing change. These include creative problem solving, balancing between change and continuity, focus on employee well-being, communication via social networks.

According to Birken et al. (2012), middle management support for innovation is pivotal to successful strategy implementation and successful business outcomes.

On the other hand, there is evidence that middle management could stifle innovation for various reasons (Birken et al., 2012). They propose a model for middle managers' impact on innovation in Healthcare, where middle managers have to take an active role in diffusing info about innovation, synthesizing info about innovation to make it actionable, mediate between strategy and day-to-day activities, and sell innovation to employees and to top management.

Burgess (2013) found that middle managers in the hospitality industry struggled to exhibit entrepreneurial behaviour, even though it was encouraged by top management. He cites structures, and bureaucratic processes to be main antecedent of this phenomenon. Thornberry (2003) found that managers in corporations can be trained to act as entrepreneurs and drive new value creation for these companies.

Dutton et al. (1997) found that managers assess the organisational environment for selling ideas to the top management and must perceive the environment as favourable to feel comfortable to sell the ideas.

Kuratko et al. (2005) proposed a model for entrepreneurial behaviour of middle managers. Their model suggests that entrepreneurial behaviour depends on middle managers' perceptions of organisational and individual outcomes of their actions. For example, they claim that managers will exhibit entrepreneurial behaviour if they perceive the outcomes of their actions to meet or exceed their expectations.

Table 4 summarises the findings presented above differentiating between hindering and facilitating factors shaped by TMT and middle managers.

Table 4. Middle Managers and Innovation - Key Findings

Factors Facilitating Innovation		**Factors Hindering Innovation**	
Factors	**Authors**	**Factors**	**Authors**
TMT involvement in disruptive innovation projects	Amabile & Pratt (2016) Christensen (2013)	Focus on core business, Patterned meetings, planning and execution schedules	Ren & Guo (2011)
Rewards, Recognition, Resources	De Jong & Hartog (2007) Kuratko, Ireland, & Hornsby (2004)	Risk aversion, Inability and unwillingness to execute on strategic initiatives	Reynolds (2017) Sharma (1999) Byrnes (2005)
Encouragement of risk taking, Tolerance to failure	Kuratko, Ireland, & Hornsby (2004)	Structures, Bureaucratic processes, Inability to exhibit entrepreneurial behaviour	Burgess (2013)
Transformational leadership, Innovation culture	Chen et al. (2012)		
Shared vision, Social integration, Contingency rewards	Jansen et al. (2008) Lubatkin et al. (2006)		
Context of a radical change	Dopson & Stewart (1990) Huy (2001)		
Idea generation, Leveraging informal network; Maintaining momentum of change initiatives; Tension management	Huy (2001)		

And so, it appears, that middle managers take central stage when it comes to supporting innovation programmes and projects in a company for better or for worse; they can be key to making innovation succeed, and they also can be the ones to stifle innovation. This depends, for the most part, on the business environment these managers operate in, internal environment such culture, structures, and processes, and the managers' perceptions about the potential outcomes of their entrepreneurial actions.

2.3.3.1. Implications for Leadership

The innovation-fostering behaviours reviewed above can be seen through the lens of the Transformation Leadership theory. It is the most studied theory in the context of ambidexterity (see Baškarada et al. 2016; Jansen et al., 2008, 2009a, 2009b; Lubatkin et al., 2006). It was introduced by Burns (see Burns, 1978) and later evolved by Bass (see Bass, 1985) and suggests that transformational leadership is measured by the extent to which leaders influence their followers' motivation and performance – not through a give-and-take relationship, but through influence, empowerment, and guidance through uncertain times, among other aspects. This relationship manifests itself in day to day interactions and in more formal personnel development and training.

There are four main components to transformational leadership (see Avolio & Bass, 2002, pp. 2-3):

1. Idealized leadership. Transformational leaders are seen as respected, admired, and trusted role models.
2. Inspirational motivation. Transformational leaders motivate their teams by envisioning a desired future state and sharing that vision with them.
3. Intellectual stimulation. Transformational leaders encourage creativity, risk taking, and challenging status quo.
4. Individualized consideration. Transformational leaders recognize individual strengths of their team members and help individuals grow by coaching and mentoring them.

Jansen, Vera & Crossan (2009) have found the transactional leadership competencies to be more aligned with exploitation, while transformational leadership competencies are more aligned with exploration. Baškarada et al. (2016) corroborated the findings of Jansen et al. (2009a). According to them, this is because transformational leadership is typically associated with uncertain and turbulent environments (where the need for exploratory innovation arises) while transactional leadership is more often associated with maturity and stability.

In a survey of Taiwanese strategic business units, Chen et al. (2012) found that transformational leadership had a positive effect on technological innovation at the business unit level, and innovation culture enhanced said effect. Jansen et al. (2008) tested multiple hypotheses about the impact of certain attributes of leadership on ambidexterity in a large

European financial services firm. They found that shared vision, social integration, and contingency rewards all lead to increased organisational ambidexterity, with transformational leadership moderating the effect of each. Similar results were found by Lubatkin et al. (2006) in small to medium sized firms.

And so, the leaders need to recognize when they are in circumstances that demand transformational rather than transactional leadership and adjust their mindsets and behaviours accordingly, although this may be challenging since some scholars suggest that transformational leadership behaviours might be correlated with enduring personality traits (see Hetland & Sandal, 2003; Judge & Bono, 2000).

This topic will be further discussed in relation to recommendations made in Chapter 6 in the context of shaping a culture of innovation and ambidexterity.

2.3.4. Risk Aversion and Risk Taking

Risk-averse attitudes of firms in general, and of middle managers in particular are perpetuated by the current market position of success (Assink, 2006). The literature offers explanations based on agency theory (Eisenhardt, 1989; Freeman & Engel, 2007; Holmström, 1989; Jensen & Meckling, 1976), but little advice is given on how to address this challenge.

With risk taking being a clear antecedent of a firm's entrepreneurial behaviour (see Burgess, 2013; Kuratko et al., 2004; O'Reilly & Tushman, 2008), it's important to understand the relationship between the individual's risk taking and the organisational risk taking. Antoncic (2003) attempted to shed light onto a paradox where companies with risk-averse individuals exhibited risk taking behaviours. He proposed a conceptual framework for linking the two as presented in Figure 2 below.

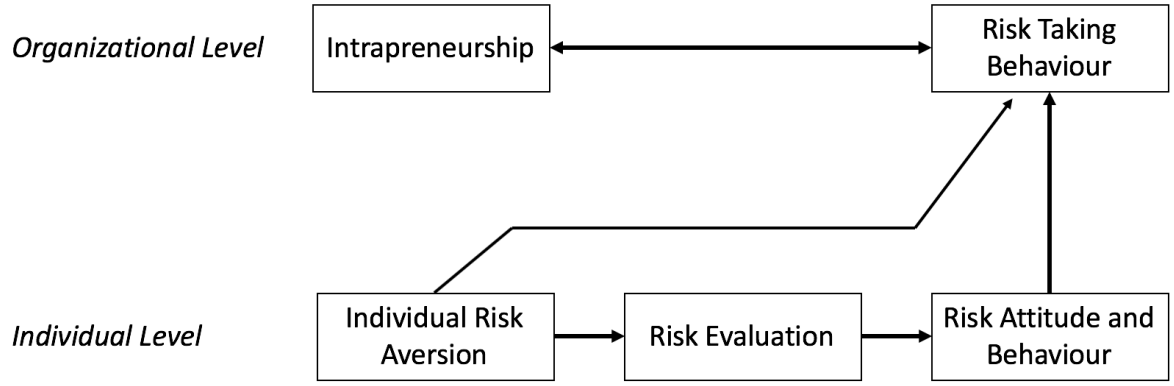


Figure 2. Risk Paradox in Intrapreneurship.
Source: Antoncic (2003)

Antoncic (2003) based his conceptual framework on three theories explaining the individual's cognition and behaviours with respect to risk: Theory of Planned Behaviour, Prospect Theory, and Agency Theory. Several key propositions in Antoncic's model are worth elaborating to explain the relationships presented in Figure 2 above:

- "*Proposition 1a: Risk taking propensity will not be associated with attitude towards risk taking*" (Antoncic, 2003, p. 9).
- "*Proposition 1b: Risk taking propensity will not be associated with risk taking behaviour*" (p. 10).
- "*Proposition 6a: Risk-oriented organisational culture will have positive impact on attitudes towards risk taking*" (p. 14).
- "*Proposition 6: Risk attitude will be positively associated with risk taking behavioural intention*" (p. 15).
- "*Proposition 8: Risk taking intention will be positively related to risk taking behaviour*" (p. 16).

Ireland, Covin, & Kuratko (2009) recognised Antoncic's model as one of the key Corporate Entrepreneurship models. Monsen & Wayne (2009) used Antoncic's model in seeking to understand how staff and managers react to strategic entrepreneurship.

The three theories mentioned above deserve more detailed attention due to their relevance to managerial behaviour in the context of corporate entrepreneurship and ambidexterity, as all three deal with risk-taking at the level of an individual manager.

2.3.4.1. Theory of Planned Behaviour

Theory of Planned Behaviour (TPB) states that an individual's attitude toward behaviour, subjective norms, and perceived behavioural control influence behavioural intentions, and, eventually, influence and shape the individual's behaviours (Ajzen, 1991). This is depicted in Figure 3 below.

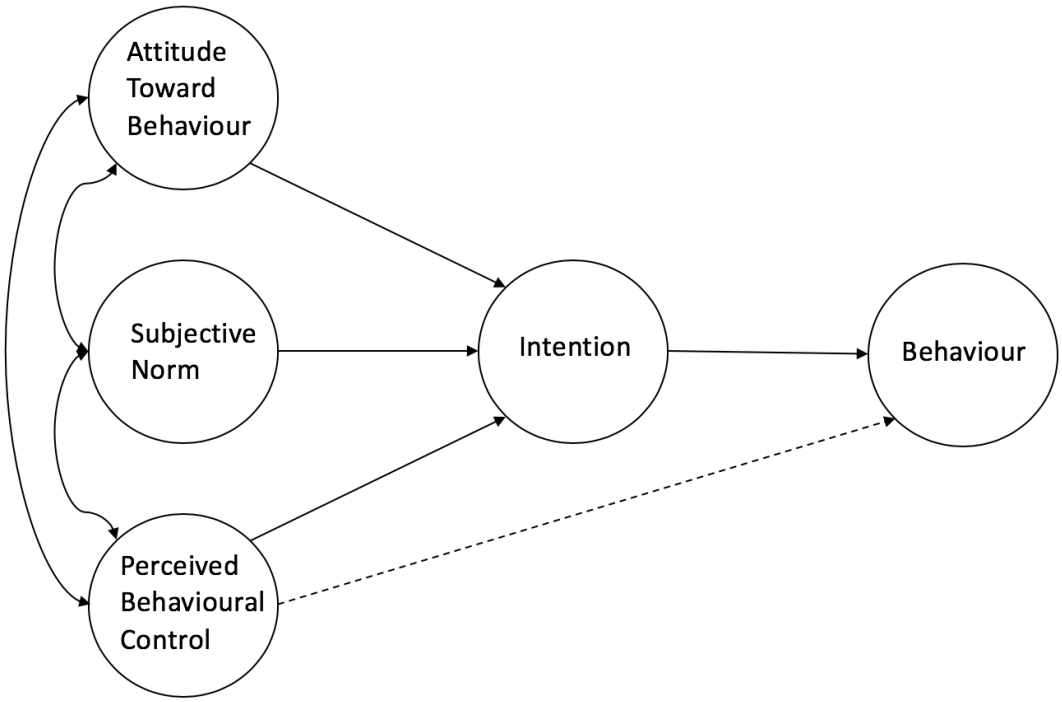


Figure 3. Theory of Planned Behaviour
Source: Ajzen, 1991

Attitude toward behaviour refers to an individual's anticipation of the outcome from enacting that behaviour. If it is perceived as positive, the individual will be more likely to enact said behaviour (Ajzen, 1991).

Perceived behavioural control refers to the degree an individual believes they control the behaviour. TPB suggests that people are more likely to enact the behaviour if they feel they

are in control of it (Azjen, 1991). Subjective norm refers to an individual's perception of social pressure to either perform or not perform a certain behaviour (Azjen, 1991). Intentions include the motivational factors associated with a behaviour (Azjen, 1991).

According to Liñán & Fayolle (2015), TPB has become one of the most popular theories in social psychology and became a reference theory in the field of entrepreneurial intentions.

TPB is uniquely relevant in the context of ambidexterity and Corporate Entrepreneurship, because it implies that managers will enact risk taking behaviours (those associated with exploration) if they anticipate positive outcome from their endeavour. In other words, if managers perceive the culture to be less tolerant of failure, they may not engage in entrepreneurial behaviour associated with exploration.

2.3.4.2. Prospect Theory

In contrast to TPB, Prospect Theory (PT) focuses on the statistical rationality seen to underpin decision making. PT was developed in response to challenges presented by Expected Utility Theory (EUT) widely used in economics research to describe decision making under risk (Barberis, 2013). EUT assumed that all rational people will want to obey the axioms of EUT (i.e. make a rational choice based on probability and subjective value of possible outcomes), and that they actually do so in reality, whereas observations of decision making under risk demonstrated frequent violations of EUT (Kahneman & Tversky, 1979).

PT is viewed as the best predictor of how people make decisions under risk in experimental settings (Barberis, 2013). It has four main components as described below.

Kahneman & Tversky (1979) propose four explanations about decision making under risk:

1. People put more value on gains and losses relative to their point of reference (their expectations), rather than on an absolute level of wealth. One analogy they offer, is that we are more sensitive to changes in temperature, loudness, and brightness than to their absolute values.
2. People are more sensitive to losses, than to gains of the same magnitude.
3. People tend to be more risk-averse when the gains are moderate, and more risk-seeking with loses.

4. People tend to put more weight on less likely, more extreme outcomes, at the tails of the outcomes distribution.

PT is often mentioned in research on middle management in contexts of innovation, entrepreneurship, and managerial sensemaking (Busenitz & Barney, 1997; Dutton & Jackson, 1987; Hill & Levenhagen, 1995; Ren & Guo, 2011; Taylor, 2017; Tellis & Chandy, 1998; Van de Ven, 1986), yet it is rarely the main theory underlying the research, most often complementing theories like the Agency Theory described in the next section. PT has also been used in conjunction with Personal Construct Theory (see section 2.5.5) to assess why boards of companies in regulated industries often make errors of judgement and don't identify areas of major risks (see Woolford, 2014).

The main criticism of PT is that it is hard to apply it outside of a laboratory setting, mainly due to the difficulty to define what do gain and loss mean in a particular setting, and what the reference point (the initially expected outcome) to be considered (Barberis, 2013).

While PT's focus on risk is relevant in the context of ambidexterity, PT is less relevant to the present research as it heavily relies on the examination of statistical rationality rather than on processes of cognition and sensemaking.

2.3.4.3. Agency Theory

This thesis is concerned with middle managers and how they approach exploratory innovation projects with respect to techniques, metrics, and goals. Agency Theory's focus on goal alignment throughout the hierarchy in conditions of uncertainty makes this theory of particular interest to this thesis, because ambidexterity is perceived differently by managers at different levels (Raisch et al., 2009) and project success is perceived differently by different groups of stakeholders (Fowler & Walsh, 1999; Mcleod & Macdonell, 2010) – while alignment is required for optimal results as described in the next section. Also, Agency Theory (AT) makes for a better theoretical basis for this research over PT due to PT's limitations (its focus on a binary set of outcomes (see Barberis, 2013)) and over TPB due to TPB's lack of acknowledgment of the corporate hierarchy, which is of particular interest in this thesis.

Agency Theory (AT) was developed in the 70s, combining elements of principal-agent problem, agency costs, and theory of the firm (Eisenhardt, 1989; Holmström, 1989; Jensen &

Meckling, 1976). It is concerned with two main scenarios: (a) conflicting goals between the principal and the agent, and (b) difficulty for principal to validate agent's actions (Eisenhardt, 1989). For definitions of principal and agent, see 'Principal-Agent Problem' entry in the glossary. One example of agency is cannibalisation risk, where new inventions may threaten an established product, leading to a conflict of interests for managers at various levels and roles (Freeman & Engel, 2007).

According to AT (Eisenhardt, 1989), outcome-based contracts (as opposed to behaviour-based contracts) between the principal and the agent are effective in controlling the agent's opportunism. This is because the agent's asymmetric information, different risk aversion, and self-interest may differ from that of the principal (Eisenhardt, 1989). However, many organisational contracts that aim at alignment of outcome-based goals and metrics are inherently incomplete, as they cannot account for risk and uncertainty inherent in innovation (Freeman & Engel, 2007).

Holmström (1989) has developed an extension to AT, which he called multi-task agency theory, to discuss the incentive costs in large corporations with regards to innovation and routine work. According to Holmström, incentives cost for a task depend on the entire portfolio of tasks and increases as that portfolio becomes more heterogeneous. Specifically, mixing easy to measure tasks (routine tasks) and hard to measure tasks (innovation tasks) is very costly, as it may lead to either misallocation of attention or misallocation of risk. Holmström found that excessive bureaucracy and optimisation for uniformity in resources and processes that usually can be observed with large organisations are detrimental to innovation. Comparing large organisations to start-ups which innovate faster, especially bringing disruptive innovations faster to the market, Holmström suggests decentralizing innovation in particular and R&D in general to solve the multi-task agency problem and the incentive cost associated with mixed task portfolios. Further, Holmström proposes a venture capital (VC) model for incentivizing the "monitor" - the senior manager in charge of innovation. By aligning innovation incentives with the VC model, the monitoring of contracts under the agency theory is accomplished by means of market forces, reducing asymmetry in information between the principal and the agent.

Agency problems seem inevitable in the context of Corporate Entrepreneurship (CE), as CE success requires top management to provide some level of autonomy to the middle management, resulting in information asymmetry, and raising the agency risks (see Kuratko,

Ireland, & Hornsby, 2004). Interestingly, Latham & Braun (2009) found that when organisations face decline, managers with few resources and low ownership tended to take major risks – a behaviour that is more aligned with the prospect theory reviewed earlier, than with the agency theory.

In a survey of small and medium-sized high-technology enterprises, Randall et al. (2017) found that misalignment in goals has led to opportunistic behaviours. They cite several sources in support of the claim that misalignment in goals is detrimental to project outcomes, whereas alignment helps to curb opportunism and improve the outcomes.

Antoncic (2003) indicates that in some organisational contexts designing contracts may be impractical due to their complexity. He suggests that in such scenarios, organisational culture might be a better mechanism than the AT focus on formal contracts.

The next section will look at how the agency problem can be addressed in business practice with help of goal alignment frameworks (or contracts, in AT terms).

2.3.4.4. Solving the Agency Problem with Alignment

The key issue in agent-principal problem is a mismatch in expectations of project or initiative outcomes between TMT and a middle manager, a manager and an employee (see Eisenhardt, 1989). If different outcomes are pursued by the different parties it is likely that business goals may not get achieved, as a result leading to suboptimal business performance (Eisenhardt, 1989; Decoene & Bruggeman, 2006; Holmström, 1989).

Outcome based contracts (Eisenhardt, 1989), became foundational in development of frameworks and methodologies for organisational alignment. Contracts in this context refer to common goals and metrics (Decoene & Bruggeman, 2006), shared between a principal and an agent for alignment on outcomes. Further, organisational alignment refers to how these contracts cascade throughout all levels and functions in an organisation.

Chandrasekaran & Mishra (2012) found that proper alignment between the goals of an R&D team and the goals of an organisation leads to higher psychological safety among the team members.

In the last two decades several frameworks have been developed to help organisations create and track the alignment, to solve, among other things, the principal-agent problem. Example

of such frameworks are the Balanced Scorecard (BSC) (Decoene & Bruggeman, 2006; Ivanov & Avasilcăi, 2013; Kasie & Belay, 2013; Montgomery & Perry, 2011) and Rhythm (Thean, 2014; Thean et al., 2017; Walcott, 2014). Whether applied separately or in conjunction with each other, in this author's opinion BSC and Rhythm provide a practical way for companies to match the goals between principals and agents and monitor and measure these goals, thereby offering business practitioners a viable framework to deal with the agency problem. Moreover, as managers decide on the appropriate metrics to track and measure success of exploratory projects, following these frameworks may ensure these metrics align throughout the hierarchy – across different management levels and employees.

2.3.5. Incentivizing Innovation Behaviour Among Middle Managers

Merriman and Sen (2012) indicate that incentive schemes are a way to align the outcomes between the principal and the agent, and those schemes need to be optimised to favour a particular type of focus among multiple competing initiatives. Managers who are invested in the business success are more likely to come up with and drive initiatives (Byrnes, 2005). This seems to imply that incentives can be an effective tool to direct managers' attention to innovation activities in general, and exploratory projects in particular. However, as the following account indicates, companies do not always use incentives in the most appropriate way.

Freeman & Engel (2007) indicate that often incentives between managers and employees engaged in innovation projects are not aligned in such a way where both would fail/succeed together. Instead, the participants in innovation processes are compensated based on their role and level in the company as if they were engaged in a typical activity with traditional outcomes.

A majority of organisations implement short-term incentive schemes for middle managers, and in most cases, it is bonus-based to reward the achievement of business results through superior performance (Grigoiadis & Bussin, 2007). These findings are not favourable for exploratory innovation, because when innovation through exploration is a goal to be achieved, it is incentives that tolerate early failure and reward the long-term outcome are the ones that lead to better business outcomes in the long run (see Christensen, 2013; Manso, 2009; Quinn, 1985; Ries 2011). Moreover, in a laboratory experiment, Manso (2009) found that contrary to some prior claims by principal-agent theorists, incentives for early failures do not lead to a reduced effort on an agent's part. Tushman & Nadler (1986) also found that

short term rewards stifle innovation. They advocate for rewarding innovative employees with attendance of tradeshows where their inventions are showcased or giving special rewards to innovative employees. In their views, managers should use the rewards and incentives levers to foster innovativeness. Extrinsic rewards while helpful are not as impactful as intrinsic rewards when it comes to innovation, and leaders should look for ways to foster intrinsic rewards (Mumford & Licuanan, 2004).

Decoene & Bruggeman (2006) build on agency theory, and expectancy theory (see Vroom, 1964) and argue that strategic alignment in context of BSC, with extrinsically motivating incentive plan increases managers' motivation and leads to higher organisational performance. They tested this theory on a single case study only, and the results could not verify the theory as there was no strategic alignment evident in the chosen company. The deductive reasoning leading to the theory itself seems reasonable but requires further validation.

Lerner & Wulf (2007) found a strong positive relationship between long term incentives and number of patents and their originality. They also found that short term incentives did not have a similar effect. One challenge with their research is reliance on number of patents rather than new products or services as a way to approximate the innovation outcomes.

Barros and Lazzarini (2012) evaluated two incentives schemes: pay for performance and promote for performance. They found that promotion-based incentive is stronger for encouraging innovation.

With this in mind, it’s imperative for organisations to design their incentive schemes in a way that recognises different motivations associated with exploitative and exploratory projects. Incentives schemes tailored to exploratory innovation projects would show tolerance for failure and emphasise long term success over immediate returns. Organisations should find a way to foster intrinsic motivation of employees, and not rely only on extrinsic rewards.

2.3.6. Summary

For the purposes of this thesis, the middle manager was defined as any manager below the Top Management Team (TMT). Middle managers are the link between the TMT and the rank-and-file employees. They are implementing the strategic direction of the TMT and often are the ones driving change.

The role of the middle manager has been discussed in literature for decades, and at different times middle managers performed roles at various degrees of strategic importance.

While middle managers are key for the success of corporate entrepreneurship initiatives and exploratory innovation projects, they may also be the ones to stifle innovation.

Risk taking is an antecedent of entrepreneurial behaviour at both the individual and the organisational levels. Several theories help us understand the risk-taking behaviour: the Prospect Theory, the Theory of Planned Behaviour, and the Agency Theory.

Risk-aversion leads to an agency problem and is one of the key reasons why middle managers may stifle innovation. Agency problem develops when a principal and an agent have different goals, interests, and possess different information. As a result, a principal can't verify that an agent, who acts on the principal's behalf, performs in accordance with the principal's expectations. Agency problem often develops in conditions of uncertainty, and therefore more likely to develop in context of corporate entrepreneurship and ambidexterity. Goal misalignment and opportunism may lead to suboptimal project outcomes, and in that, Agency Theory is of particular interest to this thesis.

Alignment frameworks, such as BSC and Rhythm, help address the agency problem, by aligning the goals of agents and principals, forming a contract between the two parties, and subsequently monitoring the progress towards these goals with an outcome-based metrics and KPIs.

The majority of organisations do not have incentive schemes that are aimed at fostering innovation. These are typically short-term focused, extrinsic in nature, and do not foster experimentation that is key to a culture of innovation.

Thus, the way in which managers handle these issues in the service of alignment is important, and so the next section will focus on the management of exploratory projects as opposed to exploitative projects. Detailed attention will be given to project outcomes and the measurement of success of exploratory projects in particular.

2.4. Project Management in Context of Ambidexterity

Over the past few decades the discipline of project management has substantially matured (Ika, 2009; Leifer et al., 2000). The body of knowledge on this subject, however, is largely

based on traditional projects that could be appropriate for incremental innovation, but inappropriate for exploratory innovation projects faced with different types of risks and uncertainties (Leifer et al., 2000). Leifer et al. (2000) called for new approaches and tools to be developed to extend the project management body of knowledge and practice. Agile and Lean development methods (see Cagan, 2017; Ries 2011) are examples of how the field of project management has evolved in the last two decades. Some research was done on impact of project portfolio management (e.g. Petro, 2017) and Agile project management (e.g. Sailer, 2019) on ambidexterity.

2.4.1. Managing in Complex Contexts

In complex business contexts where information is incomplete, it may be impossible to predict the outcome of actions (Aram & Noble, 1999). When certainty is high, or agreement is high, typical planning- and vision-based management techniques can be employed successfully (Aram & Noble, 1999). However, when certainty is low, or agreement is low, the environmental complexity increases and the decision-making process "*becomes more intuitive, hard to programme, a messy discontinuous process*" (Aram & Noble, 1999, p. 325). McKenzie et al. (2009) build on the conceptual work of Aram & Noble (1999) and point out that complexity increases as managers advance in their careers, and in those circumstances, conventional thinking becomes detrimental.

Kurtz & Snowden (2003) argue that individuals find themselves in four business contexts: simple, complicated, complex, and chaotic. They describe the Cynefin framework as an aid in sensemaking as presented below and emphasize that different leadership techniques are required in different contexts.

1. **Simple context**. This context is characterised by clear causal relationships, with a clear understanding of actions to be taken, as information is available to all participants. Leaders sense, categorise, then respond. Problem solving in this context follows best practices. Here, 'best practices' refer to standard operating procedures that are acceptable as most effective in a given situation. Incorrect classification of issues as simple, and over-reliance on past experiences, are among the dangers leaders face (Snowden & Boone, 2007).

2. **Complicated context**. Multiple right answers are possible in this context, and causal relationships do exist, but may not be visible to the stakeholders. Good practices rather than best practices may be more appropriate in these situations, and experts are often called in to help reach decisions. Leaders sense, analyse, then respond. Longer decision cycles and a risk of reaching analysis-paralysis due to expert disagreements are likely in this context (Snowden & Boone, 2007).

3. **Complex context**. In this context it is unclear what the right answer is – even to the experts. The nature of the situation is unpredictable, and leaders are in the realm of "unknown unknowns" (Snowden & Boone, 2007). In these situations, leaders should probe through experimentation first, sense, then respond (Snowden & Boone, 2007). Kurtz & Snowden (2003) define exploration (vs. exploitation) as a movement from complicated context to complex context. Exploratory innovation projects are most associated with the complex context, as issues dealt with in new product development are complex and knowledge generated is tacit (Goffin & Koners, 2011).

4. **Chaotic context**. In this context relationships between cause and effect constantly shift and are impossible to determine. Leaders should act first to establish order, sense, and then respond to transform the context from chaotic to complex (Snowden & Boone, 2007).

The Cynefin framework is frequently referenced in literature on decision-making in project management in complicated and complex contexts (e.g. Appelo, 201; Pelrine, 2011; Shalbafan et al., 2018; Wingo & Tanik, 2015). It drew some criticism from Firestone & McElroy (2011), as in their opinion the contexts are too limited, and the model lacks rigorous foundation. In this author's opinion, the Cynefin framework, and the conclusions it offers for complex contexts typical for exploratory innovation projects, may be helpful as they seem reasonable and consistent with other authors (e.g. Aram & Noble, 1999; Teece, 2016).

As it follows from the above, when innovation projects with high uncertainty are considered, organisations find themselves in complex business contexts. In these situations, they need to recognise that different management techniques and strategies are required to succeed. Experimentation (Cagan, 2017; Ries, 2011, 2017) becomes critical to determine the right response, rather than following established processes and best practices. Experimentation in this context refers to the product team's identification of risky assumptions about viability, desirability, and feasibility (Cagan, 2017), and to running frequent experiments with

customers to confirm that the product team is building something which will ultimately succeed in the market (Cagan, 2017; Ries, 2017), proving the product-market fit. Therefore, it becomes crucial to identify the ways in which managers interpret the situation they are in, and construe the appropriateness of their techniques, including the metrics they use to achieve the goals they have set (see McGrath, 2013; Mumford & Licuanan, 2004). The next two sections will expand on this notion.

2.4.2. Management Strategies for Investment Horizons

2.4.2.1. The 'Three Horizons' and 'Zone to Win' Frameworks

Baghai et al. (2000) introduced a model for investment in innovation that allows large and mature companies to develop short term and long-term investment strategies. Short term strategies are aimed at defending the core business, and long-term ones at exploring new products and markets. In that model, core business investments fall into the first category, called Horizon 1; Horizon 2 projects are typically emerging businesses with a significant new opportunity for the company; Horizon 3 refers to early seeds into what could become a significant opportunity in the future.

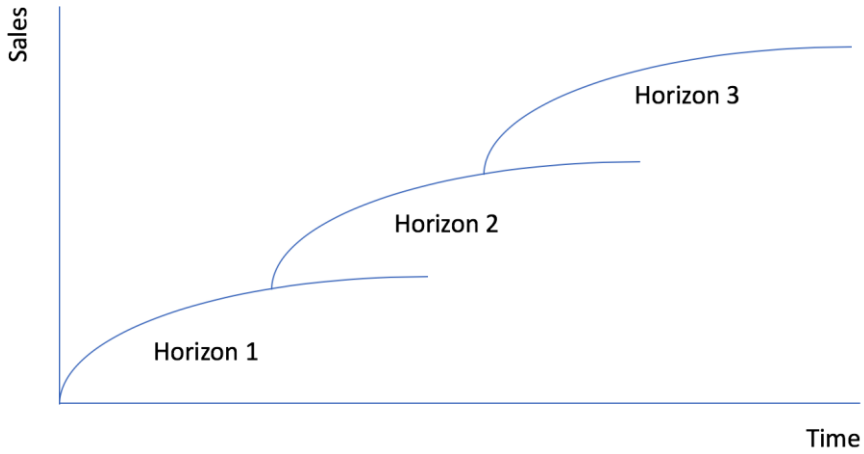


Figure 4. Three Horizons of Innovation.
Source: Baghai et al. (2000)

The 3 Horizons model became a fairly popular investment framework among practitioners (e.g. Carbone, 2012). Recently a new investment framework was developed by Moore (2015) as an evolution of the 3 Horizons model and has been adopted by companies such as

Microsoft and Salesforce.com (Moore, 2015). This new framework, called 'Zone-To-Win', offers concrete practical means of identifying projects belonging to each of the three horizons, and suggests investment allocations and management and leadership techniques to be applied in each. Moore (2015) maps the three horizons to four types of project a company typically undertakes: performance, productivity, incubation, and transformation projects. Horizon 1 projects map to the 'Performance Zone' (core product and services contributing 10% or more to the bottom line) and the 'Productivity Zone' (projects aimed at keeping the business running, like business systems). Horizon 2 maps to the 'Transformation Zone' (these projects are being accelerated to become Horizon 1 projects in near future). Lastly, Horizon 3 maps to the 'Incubation Zone' (where most early stage innovation projects are). Moore recommends 4% of the investment to be allocated to the 'Incubation Zone' and running each project in the 'Incubation Zone' as a separate entity, following a VC funding model.

The management and leadership techniques to be applied to projects in the 4 zones map to those applied in the corresponding horizons (see Moore, 2017).

Table 5. Zone to Win. Source: adapted from Moore (2017)

Transformation Zone Horizon 2 (Products accelerated to contribute at least 10% revenues)	**Performance Zone** Horizon 1 (Products contributing at least 10% revenues)
Incubation Zone Horizon 3 (Products incubated with the aim to move to the Transformation Zone)	**Productivity Zone** Horizon 1 (Projects, Systems supporting the product offerings in the Performance Zone)

In this model, exploratory projects would typically fall into the 'Incubation Zone' and the 'Transformation Zone'. Moore's model implies that different metrics would apply to different zones since it is built on the 3 horizons model. Moreover, it implies that metrics change for a particular project over time, as that project moves from the 'Incubation Zone' to 'Transformation Zone' and to the 'Performance Zone'.

2.4.2.2. Process Management vs. Lean Innovation Management

Projects in Horizon 1 would typically require traditional management and leadership techniques, while projects in Horizon 2 and Horizon 3 carry more uncertainty and ambiguity, and therefore require techniques more appropriate to start-ups (see Baghai et al., 2000; Blank, 2015; Ries, 2011; Teece, 2016).

Blank is considered a thought leader in the lean innovation approaches to entrepreneurship and intrapreneurship (e.g. Blank & Dorf, 2012), and in fact he was a mentor to Ries, who popularised the Lean Startup method (see Ries, 2011).

Blank (2015) builds on work by Baghai et al. (2000) and describes how different approaches apply to different horizons. In his view, Horizon 1 requires 'process management', while Horizon 2 and Horizon 3 require what he calls 'lean innovation management'. Process management is about repeatability, and execution at scale – that's where innovations are mostly around making processes and procedures better and finding efficiencies to reduce costs and optimise execution. Lean innovation management builds on the Lean Startup methodology. Projects in Horizon 2 benefit from entrepreneurial techniques such as experimentation to innovate within the existing business model. Horizon 3 projects, according to Blank (2015), are true corporate start-ups that require their own policies, processes, procedures, as well as a different set of incentives and metrics.

Table 6. The Three Horizons: Differences in Approaches. Source: Baghai et al. (2000), Blank (2015)

	Horizon 1	**Horizon 2**	**Horizon 3**
Focus	Executing to defend, extend and increase profitability of existing businesses	Resourcing initiatives to build new businesses	Uncovering options for future opportunities and placing bets on selected options
Output	Annual planning and forecasting; Detailed plans for growth through adjacencies	Business building strategies: investment budget, detailed business plans for new ventures	Decisions to explore: initial project plan, project milestones
Project Techniques	Process Management: execution at scale, repeatability	Lean Innovation Management: Entrepreneurial techniques and practices	

As outlined above, strategies for different horizons require different management techniques, goals, metrics, and incentives. The discussion on incentives was covered in more detail in section 2.3.5. The next section outlies the topic of goals and metrics in context of exploratory innovation projects.

2.4.3. Goals and Metrics

According to Mumford & Licuanan (2004), goals of innovation projects need to be defined more broadly that those of exploitative projects, and need to account for exploration, unexpected deviations, and interactions. As Leifer et al. (2000) point out:

> "*overcoming project discontinuities and progressively reducing uncertainties are the overarching goals of the radical innovation project team and its manager*" Leifer et al. (2000, p.58).

In essence, for a company to invest further into an exploratory innovation project, the project team needs to show that desirability, viability, and feasibility concerns have been addressed, and entrepreneurial techniques (e.g. Lean Startup) should be used in that pursuit (Cagan, 2017; Christensen, 2013; Leifer et al., 2000; Ries, 2017; Teece, 2016) as described in prior sections. Measuring progress against these goals in a matter most appropriate to innovation projects is therefore of high importance to these teams and to the organisation as a whole.

Metrics are important for tracking the performance of a company against its objectives and help prioritise the right activities and resource allocation (Bhatti et al., 2014; Melnyk et al., 2004; Montgomery & Perry, 2011). In 35 years of research on goal-setting theory, Locke et.al, (2002) found specific and challenging goals to positively impact performance. Numerous studies have identified a positive relationship between tracking metrics and company's performance (see Bhatti et al., 2014; Davis & Albright, 2004; Kasie & Belay, 2013). For innovation initiatives to achieve best outcomes, innovation metrics have to align with strategic goals (Ivanov & Avasilcăi, 2013; Montgomery & Perry, 2011; Muller et al., 2005).

In a survey of 84 manufacturing organisations in Pakistan, Bhatti et al. (2014) concluded that measuring performance has a positive effect on the overall performance of the organisations. They looked at a range of performance indicators, including cost, quality, time, financial outcomes, as well as customer and employee satisfaction.

In a survey of 33 manufacturing firms, Kasie & Belay (2013) found a positive correlation between the use of both financial and non-financial performance measures and the overall performance. One of their key findings was that companies which are using non-financial metrics to measure performance did not have these metrics integrated with each other, with financial metrics, or with strategic objectives. They also argue, that in labour intensive companies, where companies are dependent on employee performance, leading rather than lagging non-financial performance indicators need to be tracked more closely by managers.

Hisrich & Kearney (2014) argue that to fully benefit from innovation and entrepreneurship integration with a company's strategy, the company has to focus on objectives that are important to the market (customers and other stakeholders). This implies non-financial objectives and hence metrics companies need to track and measure success by.

With that in mind, the importance of defining both financial and non-financial metrics that are aligned with a company's strategy, and are most appropriate for business context, cannot be underestimated. Companies finding themselves in Horizon 2, and especially in Horizon 3 contexts need to be aware of the differences associated with these stages and chose goals and metrics that are most appropriate to each horizon (or 'Zone' in Moor's model).

2.4.3.1. Measuring Success of Exploitative Projects

In traditional project management, success factors and metrics have been a research topic for a long time with broad implications to practitioners, and yet there is no agreement on a common set of metrics (Ika, 2009; Toor & Ogunlana, 2010). One key reason cited is success being highly dependent on individual judgements and perceptions (Mcleod & Macdonell 2010; Pankratz & Basten, 2014) as different individuals at different levels within the organisation have different wants, needs, and expectations (Fowler & Walsh, 1999; Mcleod & Macdonell, 2010). In a thematic analysis of literature on project success, Davis (2014) concluded that there is no uniformity in perceptions of project success across the various stakeholder groups. Davis (2014) invited researchers to explore further how different stakeholder groups perceive success of projects. She indicated the focus of the extant literature on the role of Project Manager and advised to consider additional stakeholders in future research. Additionally, she noted that omissions in the literature reviewed may be the reason for not finding agreement on the topic. Indeed, Davis (2014) references do not include sources on topics of innovation, ambidexterity, and corporate entrepreneurship.

Mcleod & Macdonell (2010) reviewed the literature on project outcomes and concluded that there is more to the definition of project success and failure than the "iron triangle" of cost, schedule, and scope. They claim that project outcomes may vary based on the perspectives of participants and are constructed based on participants' sensemaking. In a longitudinal study of implementation of a software project in a large multi-national company, they confirmed the ambiguity that exists around the definition of success and failure, and found its nature to be multi-dimensional, emergent, and unpredictable. They identified six categories to perceptions of project outcomes: empirical, temporal, personal, multi-dimensional, contextual, and negotiated.

To further address this gap, Pankratz & Basten (2014) conducted research to answer the question "What criteria do IS project managers consider relevant for IS project success assessment?" (where IS stands for Information Systems). Among the 12 success criteria they identified in a case study were several criteria in the realm of stakeholder satisfaction, which is consistent with findings of Davis (2014), who indicated that project success literature evolved beyond the traditional factors such as cost, quality, and time. One of the limitations of this study is its exclusive focus on a Project Manager role, and not considering perspectives of business line managers and development managers - roles that in a software

organization correspond to Product Management and Engineering Management (see Menguc & Auh, 2010).

2.4.3.2. Measuring Success of Exploratory Projects

The issue of project success is not unique to traditional projects. All projects in a business world have a goal, and it's sensible to assume that a successful outcome is always desired. However, exploratory projects are different from exploitative projects, as these target different horizons and need to be measured differently (see Baghai et al., 2000). Traditional metrics are detrimental to innovation projects (see Henttonen et al., 2016; Kristiansen & Ritala, 2018), as these metrics assume a project will be completed, where in reality, innovation projects thrive on trial and error, and experimentation and learning are the focus and therefore should be measured (McGrath, 2013).

Innovation teams are under pressure to predict revenues from disruptive innovation in early stages (Assink, 2006). It seems the situation hasn't significantly changed from what Burgelman (1988) describes when comparing expectations of exploratory project outcomes among the various groups in a R&D intensive high-tech firm. In his research, scientists claimed that running good experiments should constitute as a performance measure, whereas managers focused on the actual results of innovative ventures in terms of financial outcomes of the firm.

Kristiansen & Ritala (2018) conducted a multiple-case study to learn how radical innovation projects are measured. They interviewed directors and managers of innovation and found that project teams struggled when financial metrics were used to measure outcomes of radical innovation projects. In a survey of 720 managers from Dutch information technology and construction industries, Blindenbach-Driessen et al. (2010) found that metrics used for innovation involving new product development were mostly ones used for traditional, incremental innovation projects. One reason for this might be the fact that their research was made before methods like the Lean Startup became popular for innovation project management.

Hauser & Zettelmeyer (1997) have proposed to use customer-driven metrics in R&D. The proposition of measuring innovation differently is also advocated by Owens & Fernandez (2014), who suggested applying venture capitalist-like incentive structures and metrics for

corporate innovation projects. Kasie & Belay (2013) cite multiple sources in support of their claim that financial metrics are harmful to innovation projects. Ries (2017) put forward a proposal to rely on a different set of metrics for innovation projects, where traditional metrics (revenue-based and sales based) may not apply. He proposes a set of metrics under the umbrella term of Innovation Accounting (IA). Such a framework, in his opinion, allows teams to have leading indicators of their progress in what inherently is a highly uncertain venture. Building on the concept of the 'Leap of Faith Assumption' (LOFA) – the riskiest assumption for a new venture – Ries (2017) claims that IA helps teams focus on testing their LOFAs, and most importantly, allows teams to track value creation with fast feedback loops - something that traditionally was a challenge for innovation projects. Some examples of IA-related metrics include traction metrics (customer sign-ups, conversion rates, new users, returning users, active users, retention rate, channel adoption) as well as revenue per customer, lifetime value per customer, and cost per customer (Ries, 2017). The concept of traction-based metrics is not new: it was originally introduced by McClure (2007) and then found its way to various textbooks (e.g. Maurya, 2016; Owens & Fernandez, 2014; Ries, 2017).

Muller et al. (2005) describe their experience as innovation management consulting practitioners and rely on their experience and literature review to propose a framework for innovation metrics. They found that while many of their clients put innovation programmes in place, managers often don't have a set of good metrics to track success of these programmes. Among those companies that do have metrics, they found, most use traditional product development metrics, such as percentage of sales, number of patents, and number of ideas submitted. While useful, these metrics offer an incomplete picture of a company's innovativeness (Muller et al., 2005). They suggest two key metrics to track the innovation programme success:

1. Number of ongoing experiments and ventures

2. Number of times during the past 5-10-20 years in which senior management has redefined the company's core business.

Muller et al. (2005) recommend incorporating innovation metrics with the existing methodology such as Balanced Scorecard.

Unfortunately, Muller et al. (2005) provide few details on the methodology used to collect and analyse the data used in their research. For example, it is unclear, what stakeholders

were surveyed, and what if any differences were found among the various stakeholder groups.

Different metrics may apply to different stages of an exploratory innovation project. Kristiansen & Ritala (2018) suggest applying innovation metrics during the early phase (during the customer discovery) and apply exploitative metrics when projects reach maturity. They build their argument on the work of Henttonen et al. (2016), who, in a single case study found that more indicative measures like "level of innovativeness" were often used in the early stages of an innovation project, until sales and other financial figures become available. Although Henttonen et al. (2016) did not clarify what type of innovation they focused on, their findings and later recommendations by Kristiansen & Ritala (2018) align with Baghai et al. (2000) 3 horizons model. In that model as projects move from Horizon 3 to Horizon 2 to Horizon 1 over time, what constitutes the appropriate metrics changes too.

2.4.4. Summary, and an Initial Model

Project management is a mature discipline that has been researched and perfected over the decades. However, not all projects are equal, and when it comes to exploratory innovation, there seems to be relatively little research on the topic.

Exploratory innovation projects are unique in that they carry risk inherent in their uncertain and ambiguous nature. Therefore, techniques that can successfully be applied to traditional projects (including exploitative innovation projects) do not and should not be applied to exploratory innovation projects.

Managers at different levels operate at various degrees of complexity. The higher the level, higher the complexity, and again, different types of techniques need to be applied for their decision-making process. In complex contexts it becomes critical to probe first through experimentation as leaders seek clarity in conditions of ambiguity and uncertainty.

Models such as '3 Horizons' and 'Zone to Win' aim at guiding organisations to allocate investments across the project types and provide guidance on how to lead and manage projects in various horizons or zones.

Metrics are key for tracking progress towards a company's objectives. Measuring performance has a positive effect on the business outcomes.

Exploratory projects require metrics that are different from ones used in an exploitative project management, because financial metrics may not be adequate to the early stage corporate ventures dealing with exploratory innovation. Metrics that focus on early traction of a new innovation are more appropriate than financial metrics or the traditional metrics around scope, schedule, and quality. In both exploitative and exploratory projects individual judgement needs to be exercised in the process of defining the metrics. Some scholars suggest that different metrics may apply at different stages of an exploratory project, where innovation metrics would apply in the early stages, while exploitative metrics would apply once innovation project reaches maturity.

The notion of recognizing the different business contexts, the different project types, and applying the most appropriate management techniques makes managers a critical actor in exploratory project's success.

In view of the above and building on the material presented in Table 5 (Zone to Win), Table 6 (The Three Horizons: Differences in Approaches), and Figure 4 (Three Horizons of Innovation), a conceptual model could be developed to describe how various approaches apply to an exploratory innovation project throughout its different lifecycle stages. As an exploratory innovation project moves from exploration stage to exploitation stage, the approaches applied to that project change accordingly, being consistently appropriate to its stage in lifecycle.

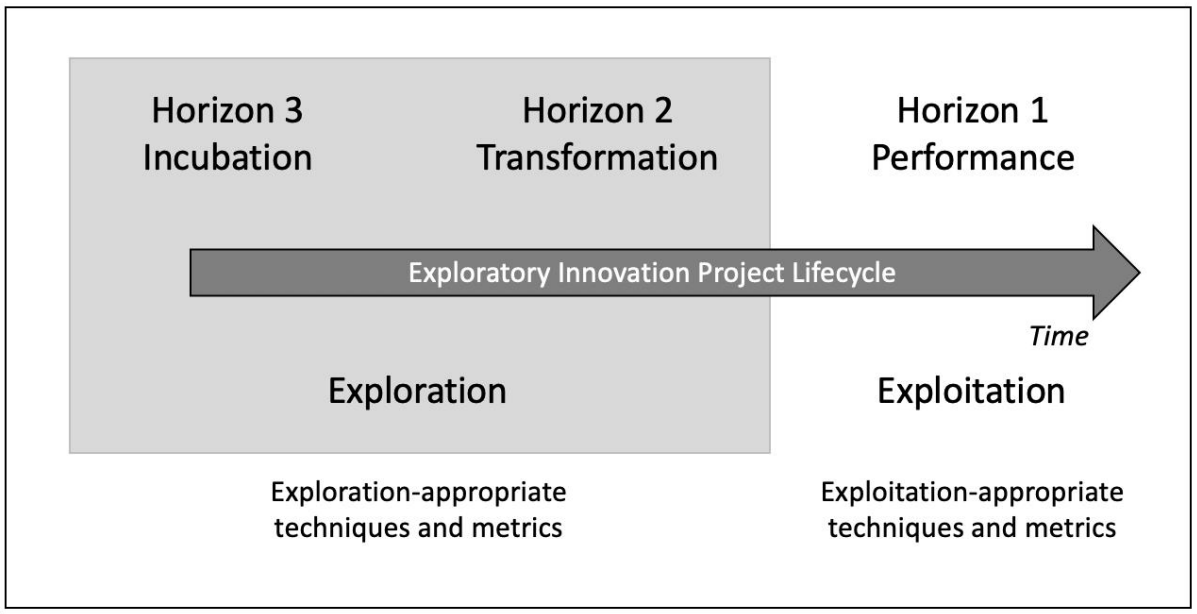


Figure 5. Exploratory Innovation Project Lifecycle.
Source: Author.

The next section will discuss antecedents of managerial decision making in conditions of uncertainty, where personal judgement is critically important to the choice of the most appropriate metrics. It will cover topics like cognition, sensemaking, and construing, and will introduce Personal Construct Theory, that is central to this thesis.

2.5. The Psychology of Managerial Decision Making

Managerial cognition and the way the managers think about their objectives, is one factor influencing the setting of strategy, and therefore cognitive activities, such as perception and interpretation are key to an organisation's success (Ambrosini & Altintas, 2019; Wrona, Ladwig, & Gunnesch, 2013). However they address their planned behaviour, section 2.3.4.1 indicates that individuals often act according to how they perceive their environment, and these perceptions influence their decision making (Sund, 2015), especially in conditions of ambiguity and uncertainty (Weick et al., 2005). According to Sund (2015), managers influence how strategic issues are labelled and categorised, although the process of labelling and categorisation is a social endeavour – a result of collective interpretation. Wrona, Ladwig, & Gunnesch (2013) also emphasise that strategic processes are shaped collectively and are influenced by different organisational members with different values, interests, and

experiences. McKenzie et al. (2009) claim that as managers advance in their careers, their past experiences may become detrimental to decision making in conditions of uncertainty, as more unconventional techniques are required in this context.

The importance of understanding how managers think has been a popular topic of research for decades (e.g. Busenitz & Barney, 1997; Daft & Weick, 1984; Maitlis & Christianson, 2014; Sund, 2015; Uygur & Kim, 2016; Weick et al., 2005).

2.5.1. The Nature of Managerial Cognitive Processes

Cognitive activities include perception and interpretation of information, and researchers have long been interested in the relationship between the cognitive activities and behaviours in an organisational setting (Wrona, Ladwig, & Gunnesch, 2013).

Managers proceed by creating and utilizing "*mental models used to make judgements and decisions [and] are shaped by […] knowledge and experience*" (Taylor, 2017, p. 2). Mental models in this context are cognitive structures that Wrona, Ladwig, & Gunnesch (2013) describe as

> "*conceptual interrelated representations of objects, persons, actions, or events. [...] They are simplified representations of reality and try to fill potential information gaps, which then are the basis for subsequent decision-making*." (Wrona, Ladwig, & Gunnesch, 2013, p. 698).

Chermack (2003) argues that not only should decision makers understand their mental models, they should seek to alter them if those models are found inadequate for the situation at hand.

Understanding of cognitive processes is essential to an organisation's success (Taylor, 2017). Mitchell et al. (2007) emphasise the importance of studying entrepreneurial cognition in particular. In their view, such research could lead to understanding of why some people become entrepreneurs, why are they able to identify opportunities, and why some are more successful than others.

Plambeck (2012) found that both the organisational context and managerial cognition influence the degree of a new product's innovativeness. He argues that TMT has an ability to change the organisational context, and thus influence the managerial interpretation which, in

turn, influences the innovativeness of a product. He invited researchers to explore further how cognition of decision makers influences entrepreneurial action as such understanding can help executives gain insight on how to enable entrepreneurial behaviour in their companies. Such an understanding is crucial to a company's success, as corporate entrepreneurship leads to superior performance of a company as discussed earlier (see Covin & Miles, 1999; Kuratko, Ireland, & Hornsby, 2004). There would appear to be two difficulties with the sample selection and data collection by Plambeck (2012). First, the study focused on the individual managers responsible for innovation in each company, rather than recognizing that multiple stakeholder groups are involved in decision making (a key finding of the extensive review by Davis, 2014). Second, while Plambeck sought to understand the managers' construing, his survey instruments and rating scales requested responses on predetermined issues rather than identifying the actual issues felt to be important by the respondents themselves, something made feasible by the Repertory Grid technique described in sections 3.3 and 3.4.

The research on entrepreneurship shows a significant focus on how entrepreneurs think, how their decision making is affected by uncertainty, ambiguity, high stress, and high risk, and in what way is their thinking different from that of non-entrepreneurs (Shepherd, Williams, & Patzelt, 2015).

In their seminal work, Tversky & Kahneman (1974) argue that when making decisions, people anticipate outcomes with various degrees of uncertainty, and rely on a limited number of problem-solving approaches – heuristics – to simplify this process. Tversky & Kahneman (1974) claim there are three main heuristics used in decision making: (1) representativeness (the degree to which one event is being associated with another event), (2) availability of scenarios to compare the current event to, and (3) adjustment from an anchor (a starting point based on initial estimate). In their opinion, these heuristics are often useful, but at times lead to errors in decision making due to common biases. One simple analogy Tversky & Kahneman (1974) give is estimation of a distance to an object. In conditions of good visibility, the object seems closer than it actually is, and as conditions of visibility change the tendency is to overestimate the size in poor visibility and underestimate it in high visibility.

Drawing on the work of Tversky and Kahneman on biases and heuristics, Simon, Houghton, & Aquino (2000) studied how entrepreneurs perceive risks associated with business decisions. They suggested that entrepreneurs may fail to perceive the actual risk due to three

cognitive biases: overconfidence, illusion of control, and use of a limited number of inputs for decision making. The illusion of control, they claim, leads individuals to believe that they can control ambiguity and uncertainty inherent in entrepreneurial ventures.

Busenitz & Barney (1997) based their research on the heuristics and biases theory presented by Tversky and Kahneman and explored the differences in decision-making processes between entrepreneurs and managers in large corporations. They found that entrepreneurs are more prone to biases such as overconfidence and tendency to overgeneralise from few observations in their decision making. Busenitz & Barney (1997) claim that in conditions of uncertainty, where cautious decision-making is not possible, heuristics can be more effective. They theorise, that applying similar heuristics in large and mature corporations may be detrimental to the business. In this author's view and in light of the review presented in section 2.2.2 on corporate entrepreneurship, this is not likely to be the case when these heuristics are applied to exploratory projects in large firms. This is because start-up techniques can be extremely useful when applied to exploratory projects in these circumstances (Teece, 2016; Ries, 2017).

In a single case study with 30 branch managers in the financial services industry, Goodhew et. al (2005) found that higher performing managers had considerably simpler cognitive structures than the low performing managers. The main reason for this, they claim, is the fact that the performance goals were clearly defined for the higher performing group of managers. Goodhew et al. (2005) used a combination of interviews and questionnaires to develop cognitive maps and understand the differences among the managers. Their methodology choices are well substantiated. Xu (2011) suggested that an entrepreneur's cognitive model of innovation is complex, since they are required to have a broad understanding of five facets (p. 913): (1) meeting the customers' needs, (2) responding to the competition, (3) developing new technologies, (4) achieving effective internal coordination, and (5) building relationships with external stakeholders. Xu's empirical findings confirmed a higher cognitive complexity among entrepreneurs in high-technology industries. As described in sections 2.3 and 2.4 above, intrapreneurs operate in conditions of uncertainty and risk, such that the goals of the exploratory projects they are leading or involved in are not as obvious as in case of exploitative projects. Following Goodhew et. al (2005) and Xu (2011) findings, one might expect that cognitive structures of managers in the context of corporate entrepreneurship are more complex. Cognitive complexity is discussed further in the context of Personal Construct Theory in section 2.5.5.3.

Entrepreneurial cognition has been reviewed by Mitchell et al. (2002). They argued that the cognitive view on entrepreneurship allows for better understanding of the entrepreneurship phenomena, especially the understanding of how one entrepreneur differs from another. Nooteboom (2009) corroborates this argument and claims that prior experiences of entrepreneurs influence their cognitive structures.

Managerial cognition (especially that of entrepreneurs and intrapreneurs) can be analysed in the context of Personal Construct Theory, as will be described in more detail in section 2.5.5.2.

In view of the above, understanding the cognitive processes and the role they play in managerial and entrepreneurial decision making is important. Managers involved in intrapreneurship may exhibit different cognitive structures and more complex cognitive structures as compared to non-entrepreneurs. Understanding the antecedents of cognitive structures and processes and their impact on decision-making and performance is key to an organisation's success.

2.5.2. Individual and Organisational Interpretation

Interpretation of the environment can be analysed at two levels: individual and organisational (Argyris, 1977; Daft & Weick, 1984), where the former is an antecedent of the latter (Dutton & Jackson, 1987).

In their seminal work, Daft & Weick (1984) claim that managers must actively make sense of events happening to and within an organisation. They define interpretation as

> "*the process of translating [..] events, of developing models for understanding, of bringing out meaning, and of assembling conceptual schemes among key managers*". (Daft & Weick, 1984, p. 286).

Daft & Weick (1984, p. 286) define a three-stage organisational learning model (see Figure 6 below) in which interpretation is where "*perceptions are shared and cognitive maps are constructed*".

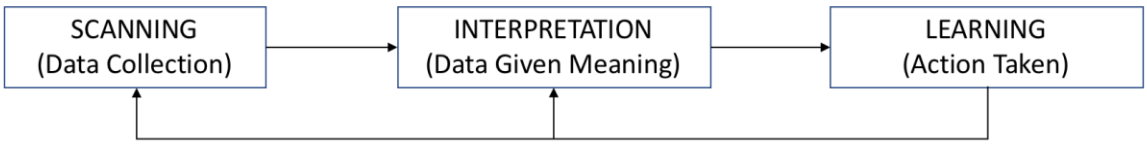


Figure 6. Relationships Among Organisational Scanning, Interpretation, and Learning. Source: Daft & Weick (1984).

Daft & Weick (1984) recognised that their model has weaknesses, optimised to be general and simple, and in that not very accurate (p. 294). They go further and categorise organisations into four interpretation modes based on beliefs organisations hold about their environment.

Table 7. Model of Organisational Interpretation Modes. Source: Daft & Weick (1984)

Assumptions about Environment	Organizational Intrusiveness: Passive	Organizational Intrusiveness: Active
Unanalysable	Undirected Viewing (Constrained interpretations, Nonroutine, informal data. Hunch, rumour, chance opportunities)	Enacting (Experimentation, testing, coercion, invent environment. Learn by doing)
Analysable	Conditioned Viewing (Interprets within traditional boundaries. Passive detection. Routine, formal data)	Discovering (Formal search. Questioning, surveys, data gathering. Active detection)

Companies with enacting and discovering modes of interpretation most closely align with characteristics of start-ups and corporate ventures (see section 2.2.2.1 for discussion on characteristics of entrepreneurial firms). Especially of interest in the context of entrepreneurship are enacting companies, which assume that the environment is unanalysable. These companies exhibit entrepreneurial capabilities (see Baum et al., 2014, p. 145), apply entrepreneurial techniques such as experimentation and testing, and ignore rules and traditional expectations (see Daft & Weick, 1984). Organisations in this mode tend to define new markets (Daft & Weick, 1984) and are likely to be associated with market breakthrough or radical innovations (see Table 1).

Daft & Weick (1984) claim their model has two key implications for managers (p. 294):

1. A manager's job is to interpret and not to do the operational work. This means managers have to take cues from the environment and to translate these cues into meaning for the rest of the organisation.
2. Managers should revisit their perceptions about the external environment that may not be as analysable as they may have assumed, and therefore they should seek to modify their approaches for the interpretation of that environment.

These implications can be viewed through the lens of the 'Double-Loop Learning' concept proposed by Argyris (1977). According to Argyris, single-loop learning refers to an organisation's approach to problem solving that involves established policies and objectives, where new information is interpreted, and a corrective action is taken to close the loop. Double-loop process, on the other hand, occurs when organisations challenge their assumptions about the environment to solve problems before taking an action.

According to Dutton & Jackson (1987), decision makers selectively attend to some strategic issues and ignore the others. The issues selected are interpreted and meanings are attributed to them. The internal environment of the firm impacts the meanings and how they evolve. Therefore, similar events may have different meanings among different organisations (Dutton & Jackson, 1987). Business opportunities and threats impact what meanings will be attached to strategic issues. These meanings lead to cognitions and motivations, which, in turn lead to organisational actions (Dutton & Jackson, 1987).

Two influential theories depict the processes involved: Sensemaking (Weick et al., 2005) focuses on the social aspect of the process and therefore focuses more on the organisational level, while the other – Personal Construct Theory (Kelly, 1955, 1963) focuses on the individual.

2.5.3. Sensemaking

In situations of ambiguity or uncertainty, individuals attempt to analyse their environment and interpret cues from it (Weick et al., 2005). Understanding of meanings by individuals seeking clarity in ambiguous circumstances inevitably leads to actions, that in turn shape change over time (Weick et al., 2005). Moreover, Weick et al. (2005) describe sensemaking as a retrospective process whereby people interpret events in the social context they are in and enact behaviour as a result of that process. Maitlis & Christianson (2014) review the

literature on sensemaking and describe it as *"the process through which individuals work to understand novel, unexpected, or confusing events"* (p.57).

There is a positive correlation between sensemaking and performance (Morandin & Bergami, 2014; Thomas, Clark, & Gioia, 1993), and between sensemaking and innovation (Deazin, Glynn, & Kazanjian, 1999; Thrane, Blaabjerg, & Møller, 2010).

People construct meaning differently because of the different backgrounds, interests and positions (Maitlis & Christianson, 2014), and because of differences in personal and business goals (Balogun & Johnson, 2004; Maitlis, Vogus, & Lawrence, 2013).

Sensemaking is also key in the context of corporate entrepreneurship, where uncertainty and ambiguity are high (see Teece, Peteraf, & Leih, 2016; Maitlis, 2005). In fact, Hill & Levenhagen (1995) suggest that both sensemaking and sensegiving (communicating to others to influence their sensemaking) are required to cope with ambiguity typical for entrepreneurial environment, and therefore – for exploratory projects. Maitlis (2005) claims, that sensemaking makes it possible for people to cope with uncertainty and ambiguity.

In the process of strategy formation, it is cognitive processes that underpin sensemaking (Narayanan et al., 2011). Cognitive structures and processes impact decisions, and sensemaking and sensegiving play a role during implementation of these decisions (Narayanan et al., 2011). Weick et al. (2005) emphasises the role social context and interaction with others play in sensemaking. This is because, in their opinion,

> "*sensemaking tends to occur when the current state of the world [with respect to the social context among other things] is perceived to be different from the expected state of the world*" (Weick et al., 2005, p. 409).

Some scholars see sensemaking as a cognitive process, while others see it as a social process (Maitlis & Christianson, 2014). Weick, in particular, discusses sensemaking in the organisational context, emphasizing the collective sensemaking (Weick et al., 2005; Weick & Roberts, 1993). Yet it's the individuals who do the sensemaking, and the individual sensemaking shapes the organisational sensemaking and its outcomes (Rouleau & Balogun, 2011). These outcomes may be suboptimal where corporate cultures, routines, and processes reduce mindfulness (Maitlis & Christianson, 2014).

2.5.4. Cognitive Ambidexterity

As described in section 2.2.3, ambidexterity can be experienced and enacted at the personal level in addition to the organizational level (Andriopoulos & Lewis, 2009; Bonesso et al., 2014; Papachroni, 2013; Raisch et al., 2009; Schnellbächer, Heidenreich, & Wald, 2019; Xiang et al., 2019). In fact, scholars have been calling for more research into ambidexterity at the individual level (see Xiang et al., 2019), because individual ambidexterity and organizational ambidexterity are interconnected (Andriopoulos & Lewis, 2009; Raisch et al., 2009).

Bonesso et al. (2014) collected comprehensive data from multiple stakeholder groups using multiple rounds of in-depth interviews. They found four situations with respect to employees' actual behaviour as opposed to their perceptions: enacted personal ambidexterity, dominant learning orientation, perceived personal ambidexterity, and full personal ambidexterity. They concluded that full personal ambidexterity – where behaviours and perceptions are fully aligned – is not easily achieved due to a cognitive dissonance (an anticipated mismatch between cognition and action) the employees experience arising from the tensions between exploitation and exploration on a personal level. Bonesso et al. (2014) suggested one reason being unclear expectations set with employees about their roles.

Chandrasekaran (2009) focused on the concept of cognitive ambidexterity at the personal level that describes the cognitive duality individual managers face as they encounter tensions of exploration and exploitation in their organisations. He claims that resolving the paradoxical tensions inherent in the ambidextrous duality is critical for managers to balance exploration and exploitation.

Karhu (2017) built on the work of Chandrasekaran (2009) and looked at managers' cognitive processes that occur as managers make sense of their situation and chose best alternatives to resolve a problem at hand. Karhu (2017) concluded that managers recognise the dualities involved in a given context and make decisions appropriately. Her study was conducted in the beverage industry, and so it is unclear whether these findings can be indicative of other industries, and whether the beverage industry managers operate in the same level of complexity (as per the Cynefin framework), as managers in the high-tech industry do. Additionally, Karhu's study focuses only on idea generation stage of new product development and does not cover the entire product lifecycle.

Both Karhu (2017) and Chandrasekaran (2009) see ambidexterity as a group process and frame their research in Weickian view of sensemaking (as described in section 2.5.3 above), which is organizational in its core (see Weick et al., 2005, p. 410). The next section will introduce the Personal Construct Theory to look in detail into the processes that occur at the individual level and how these processes might be influenced by cognitive complexity.

2.5.5. Personal Construct Theory

With cognition and sensemaking being central to managers' decision-making process, and subsequently to the understanding of what leads to success or failure of a project or, indeed, an organisation, we need to turn to a theory that helps us make sense of how individual managers think about certain issues and events in their own terms. Kelly's Personal Construct Theory (PCT) makes personal construing – the personal interpretation of experience – its basic assumption (see Kelly, 1955, 1963, 1966). PCT led to development of the field of Personal Construct Psychology (PCP) which is highly relevant to management studies with new areas of research (see Cornelius, 2015).

PCT is useful for analysing managerial decision making, because, as Butt & Burr (2004) explain, understanding of a person stems from understanding their construction, in other words, their understanding of the world. In turn, that knowledge leads to understanding of why people act the way they do (Butt & Burr, 2004). It helps turn managers' tacit knowledge to explicit knowledge (see Jankowicz, 2001; Malmström et al., 2015). This is achieved with help of Repertory Grid Technique (Fransella, 2004) which will be discussed in detail in section 3.4.

Kelly (1963) argues that people see world's realities through patterns and templates, and while these may not be a perfect fit for understanding of these realities, they only need to be useful rather than absolute. These patterns are what Kelly calls 'constructs'. These constructs are what enables actions and behaviours (Kelly, 1963).

PCT has been criticized for disregarding human emotion and therefore being too focused on cognition (see Fransella, 1995). However, constructs naturally account for emotions such as anxiety and guilt in terms of the experience of change in the construing system (Bannister 2003; Chiari, 2013; Fransella, 1995). Additionally, Fransella (1995, p. 117) has emphasized

that construing *"is about experiencing our private worlds*" and in that accounts for emotion as well as cognition.

2.5.5.1. The Basic Postulate and the Corollaries

Kelly's Basic Postulate states that "*A person's processes are psychologically channelized by the ways in which he anticipates events*" (Kelly, 1963, p.46). He elaborates this by means of 11 corollaries, of which 7 are particularly relevant to this thesis.

Construction Corollary states "*A person anticipates events by construing their replications*" (Kelly 1963, p. 50). In essence, as people look forward to a particular event, they construct that event based on their existing experience with a similar event (Butt & Burr, 2004).

Individuality Corollary states *"Persons differ from each other in their constructions of events."* (Kelly, 1963, p. 55). This is due to the fact that people anticipate events and experience them in different manner.

Dichotomy Corollary states *"A person's construction systems is composed of a finite number of dichotomous constructs."* (Kelly, 1963, p.59). This indicates that the meaning expressed by a particular construct is comprised of a polar dichotomy stating a particular contrast; thus, the construct 'risky versus certain' expresses, by means of its two poles, a different meaning to 'risky versus safe'.

Choice Corollary states "*A person chooses for himself that alternative in a dichotomized construct through which he anticipates the greater possibility for the elaboration of his system.*" (Kelly 1963, p. 64). As Butt & Burr (2004) put this, when we evaluate different constructs for a particular phenomenon it is much more important to understand the usefulness of a construct than to prove it is correct. Construing is a process – something that we do, and the meaning that we extract from this process is a result of a constant comparison and contrasting of the construct's dichotomy (Butt & Burr, 2004). When confronted with a choice, a person will tend to choose that alternative construct which aligns best with anticipation of events (Kelly, 1963, p. 67).

Experience Corollary states "*A person's construction system varies as he successively construes the replications of events*." (Kelly, 1963, p. 72). The evolution of the construct system, Kelly claims, depends on person's ability to be open to "novel events".

Commonality Corollary states "*To the extent that one person employs a construction of experience which is similar to that employed by another, his processes are psychologically similar to those of the other person*." (Kelly, 1963, p. 90). Thus, concludes Kelly, two people with different experiences and who have encountered different events, may have similar constructions of their experiences, and therefore a similar subsequent inquiry.

Sociality Corollary states "*To the extent that one person construes the construction processes of another, he may play a role in a social process involving the other person*." (Kelly, 1963, p. 95). As social interactions happen in an organisational setting (and in our lives in general), some level of mutual understanding happens, where people interpret each other constructs (Kelly, 1963). Then, people may adjust their own actions and behaviours as they anticipate the actions and behaviours of others (Kelly, 1963, p. 96). As a result, the role relationships (e.g. manager-subordinate, interviewer-interviewee) become more effective to the extent that one person understands the constructs of another (Kelly, 1963).

Construing Importance

What follows from the basic postulate in general and the 'Choice Corollary' in particular is the anticipatory aspect of PCT: the way people construe a particular issue will indicate factors which they feel are important for successful outcomes, and hence the action they will take faced with a particular choice. Different approaches for measuring success of exploitative and exploratory projects have been outlined in sections 2.4.3.1 and 2.4.3.2. In this thesis, the focus is on understanding how managers think about exploratory and exploitative innovation projects, and the relative importance of the metrics in question among the other factors they consider; hence the value of PCT becomes evident in its ability to predict how those managers will act faced with an exploratory or exploitative project in their companies.

2.5.5.2. Philosophical Stance of PCT

Kelly's work helps us deconstruct the notion of sensemaking (see section 2.5.2) at the level of individual psychology. PCT has been applied in this field for several decades (see Butt & Burr, 2004), with business scholars taking note and applying this theory to understand how managers think about a particular issue or event (e.g. Cullina 2016; Jankowicz, 2001; Malmström, Johansson, & Wincent, 2015; Pankratz & Basten 2014, 2017; Quirk, 2013).

Table 8 below summarizes select examples of RGT use in business research.

Table 8. Selected examples of PCT use in managerial studies.

Authors	Research Focus
Cornelius (2015)	Emphasis on importance of exploration of individual and shared construing (review article)
Cullina (2016)	Construing of Western leadership theories by Egyptian managers
Goffin & Koners (2011)	Lessons learnt in new product development
Gough (2014)	Recruitment difficulties experienced by recruiting service providers
Jankowicz (1990)	Personal Construct Psychology and Repertory Grid Technique use by business practitioners (review article)
Jankowicz (2001)	Use of Repertory Grid Technique to turn tacit knowledge into explicit knowledge in Financial institutions.
Malmström, Johansson, & Wincent (2015)	Differences in the way entrepreneurs construe high-profit and low-profit business models
Napier et al. (2009)	IT project managers' skills contributing to a successful project management practice
Pankratz & Basten (2014)	Managers' perceptions about a project's success

Personal Construct Theory is more than a theory of cognition. Kelly's basic postulate and 11 corollaries form a basis of what Kelly (1963) calls 'constructive alternativism' – a philosophical stance, which is an epistemology in its own right (see Butt & Burr, 2004; Fransella, 2003; Jankowicz, 2004, 2016; Kelly, 1963; Raskin, 2002). Constructive alternativism, which will be discussed in section 3.2.1 stresses that it is possible to construe a given experience in different ways, as follows from the Individuality Corollary described above.

Fransella (2003, p.24) emphasizes the 'reflexivity' of Kelly's theory, building on Kelly's claim that all people in their construing of events act as scientists trying to understand the world around them – and concludes that PCT applies to both the scientist and the person being studied. This stance will become key to the current thesis, since if one seeks to understand how others see the world in their own terms, one needs to understand their constructs. And since the researcher's quest to understand the construing of others is an act

of construing in its own right, the issue of researcher reliability becomes paramount. This will be elaborated in more detail in chapter 3 on methodology.

2.5.5.3. Understanding Cognitive Complexity

In addition to the core terms described in section 2.5.5.1, PCT offers several concepts highly relevant to the cognitive complexity involved in innovation (see in particular Xu, 2011), because cognitive complexity may influence construing as discussed below. Fransella (1995) describes several Kellyan concepts typically discussed in the clinical context, yet directly related to this thesis and its use of the notion of cognitive complexity: *tight* and *loose* construing, the Creativity Cycle, and the CPC Cycle.

Tight and Loose Construing

Tight construing is construing which leads to a predictable way of thinking about an issue at hand; conversely, loose construing involves variability and flexibility in the way of thinking about an issue (Fransella, 1995). The implication is that when construing is tight, the person may be productive, but is unlikely to be creative at that time, since flexibility is required for creativity and innovative problem solving.

Creativity Cycle

Most of us are not tight construers or loose construers, but rather move on a continuum between tight and loose construing in a cycle (Fransella, 1995). This cycle is called 'The Creativity Cycle' (Fransella, 1995). It is important to emphasise that maintaining the cycle and being able to move from loose construing to tight construing (or between the two, for that matter) is what provides the foundation for creativity and allows for decision making in conditions of uncertainty (Fransella, 1995).

CPC Decision Cycle

According to Kelly (see Fransella, 1995) people go through three stages in the process of decision making: Circumspection: considering the various options available to them; Pre-emption: selecting a particular way of construing the issue at hand; Choice: deciding that one pole of the selected construct applies, rather than the other pole. See the discussion on Repertory Grid Technique in chapter 3 for more details on construct poles.

Measuring complexity

Bieri (1955) was the first to coin the term 'cognitive complexity' in context of Kellian theory of personality. He suggested that "*the greater the degree of differentiation among constructs, the greater will be the predictive power of the individual*" (Bieri, 1955, p. 263). Over the years several indices have been developed to measure cognitive complexity. Bell (2003) mentions Bieri's original index developed in 1955, 'intensity index' developed by Fransella and Bannister in 1977, 'intraclass correlations' developed by Bell and Keen in 1981, and 'functionality-independent-construct index' (FIC) developed by Landfield and Schmittdiel in 1983. According to Bell (2003) Principal Component Analysis (PCA) has been traditionally most accepted approach to measure cognitive complexity and cites sources who demonstrated how PCA can be used to describe the structure of relationships between constructs, unlike more traditional average correlation approaches (see Fransella et al., 2004, p.119).

Heckmann & Bell (2016) derived several new measures of complexity associated with cluster analysis (see Bell, 2003) and concluded that there is little correlation between their measures and the standard measures mentioned above, arguing that the former describe aspects of construct relationships not explained by the standard complexity indices.

Section 3.4.1.3 describes PCA and a choice of index for the current thesis in more detail.

2.5.6. Summary

Antecedents of managerial decision-making in conditions of uncertainty have been a focus of management and business scholars for several decades. Cognition, sensemaking, interpretation, and perceptions are the typical terms used in this context.

Interpretation refers to the development of models to understand events, extracting meaning from them. Cognition refers to mental models people use to make decisions. Sensemaking refers to the process through which people make sense of novel or unexpected events.

Managerial cognition is an antecedent of strategic decisions. Managers often apply heuristics as they make decisions, but at times make errors due to common biases. One common bias is overconfidence, leading entrepreneurs and intrapreneurs (more so than traditional managers) to an illusion of control and the belief they can control uncertainty inherent in exploratory projects.

The manager's job is to interpret the environment by extracting cues from it and translating these cues into meaning for the rest of the organisation. Moreover, in learning organisations, managers recognise that traditional approaches to problem solving may not be appropriate and seek to modify their approaches for interpreting the environment.

Understanding of the processes preceding decision-making and action is key for an organisation's success, as meanings lead to cognitions and motivations, which, in turn lead to organisational actions. Individual sensemaking is an antecedent of organisational sensemaking and its outcomes. Strategic processes are influenced by managers yet shaped collectively by organisational members.

Personal Construct Theory is an epistemology in its own right and helps us understand what processes take place in a managers' mind, helping researchers turn managers' tacit knowledge into explicit knowledge. In the context of corporate entrepreneurship and ambidexterity, when the business environment is complex, and complexity of cognitive processes is increased, Personal Construct Theory and constructive alternativism in particular helps make sense of the managers' decision-making processes.

PCT offers a glimpse into the future as its anticipatory aspect helps predict how people will behave given a particular choice.

2.6. Literature Synthesis

2.6.1. Argument Development

This section develops an argument that leads to the research question by integrating the literature reviewed so far and positioning the research in the context of the gap that exists in extant literature on managerial decision making in the context of ambidexterity.

Radical and disruptive innovations are critical to a firm's long-term success in the market (Bower & Christensen, 1995; Christensen, 1997; Christensen, Raynor & McDonald, 2015; Leifer et al., 2000). To achieve these types of innovations that are new to the market, and at times create new markets, firms embark on exploratory innovation projects (Leifer et al., 2000; March, 1991; Raisch et al., 2009). However, innovation is not easy: there are multiple ways to fail, and special ingredients are required for it to succeed, such as strategy examination, culture of experimentation, tolerance to failure, and appropriate incentives (Cooper, 2019; Hisrich & Kearney, 2004; Martins & Terblanche, 2003). Lack of these

ingredients, unnecessarily complex processes, and risk aversion are the typical antecedents of failed innovation efforts (Assink, 2006; Büschgens et al., 2013; Holmström, 1989; Quinn, 1985; Sharma, 1999). Additionally, exploratory innovation is especially difficult in large and mature companies due to the innovator's dilemma: these companies struggle to defend the core business and innovate at the same time (Baghai et al., 2000; Christensen, 1997; Owens & Fernandez, 2014).

In an attempt to solve the innovator's dilemma, organisational ambidexterity has emerged as an organisational design, that describes how to explore (pursuit of innovation through discovery) and exploit (pursuit of efficiency to increase productivity) at the same time (Birkinshaw & Gupta, 2013; Gibson & Birkinshaw, 2004; March, 1991; O'Reilly & Tushman 2008; Raisch et al., 2009). Many scholars argue for innovation and ambidexterity to become a deliberate strategy with supporting culture and structures (O'Reilly & Tushman, 2008; Pisano, 2015; Ries, 2017; Saleh & Wang, 1993), but the strategy is rarely completely deliberate or completely emergent (MacLennan, 2009; Mintzberg & Waters, 1985; Nag, Hambrick, & Chen, 2007). Ambidexterity is contextual to the firm and the environment it operates in (Gibson & Birkinshaw, 2004; Birkinshaw et al., 2016), hence the innovation strategy formation is influenced by that context and environment.

The form of organisational design that aids exploration, is called Corporate Entrepreneurship (Covin & Miles, 1999; Hisrich & Kearney, 2014; Teece, 2016). Ambidexterity and corporate entrepreneurship lead to superior performance (Covin & Miles, 1999; Gibson & Birkinshaw, 2004; He & Wong, 2004; Kuratko, Ireland, & Hornsby, 2004; Luger, Raisch, & Schimmer, 2018; Pertusa-Ortega & Molina-Azorín, 2018; Solís-Molinaa et al., 2018). These are considered the dynamic capabilities of the firm which help organisations achieve their strategic goals (Birkinshaw, Zimmermann, & Raisch, 2016; O'Reilly & Tushman, 2008; Teece, 2014, 2016; Teece, Pisano, & Shuen, 1997). It is crucial for firms to recognise they are in a complex business environment that demands development of these dynamic capabilities (Birkinshaw, Zimmermann, & Raisch, 2016). The ability of organisations to recognise that they are in the kind of business environment that requires exploration is key to innovation success (Quinn, 1985).

While companies may recognise they are in a complex business context, it may be impossible to predict outcomes of actions they take in response (Aram & Noble, 1999) and it may be unclear what the right action is (Kurtz & Snowden, 2003), especially if the past experiences

had to do with less complex contexts (McKenzie et al., 2009). Entrepreneurial approaches such as Lean Startup help organisations cope with uncertainty, contain investments, and help address the risk-aversion challenges, while shortening the investment time-frames and allowing for ambiguity in requirements (Blank, 2015; Blank & Dorf, 2012; Owens & Fernandez, 2014; Ries, 2011, 2017; Teece, 2016).

It follows, that for exploratory innovation projects to succeed, managers have to first recognise that they are in a complex environment that is more appropriate for exploration rather than exploitation. They need to embrace the complexity of their situation (Chermack, 2003; Jankowicz, 2001) and to recognise that exploration-appropriate management techniques need to be employed (Baghai et al., 2000; Blank, 2015; Cagan, 2017; Leifer et al., 2000; Loewe et al., 2001; Kurtz & Snowden, 2003; Moore, 2017; O'Connor & Rice 2013; Owens & Fernandez, 2014; Ries, 2011, 2917; Teece, 2016) and exploration-appropriate metrics need to be set to track and measure the goals (Hauser & Zettelmeyer, 1997; Henttonen et al., 2016; Kasie & Belay, 2013; Kristiansen & Ritala, 2018; Maurya, 2016; McGrath, 2013; Muller et al., 2005; Mumford & Licuanan, 2004; Owens & Fernandez, 2014; Ries, 2017). Measurement approaches like Innovation Accounting (Ries, 2017) and traction metrics (Maurya, 2016; McClure, 2007) focus on early traction and are more appropriate to exploratory innovation projects, than financial metrics, and quality, scope, and schedule metrics.

Both the ambidexterity and the business environment may be perceived differently by managers at different levels (Raisch et al., 2009), because of different wants, needs, expectations, roles, and experiences (Fowler & Walsh, 1999; McKenzie et al., 2009; Mcleod & Macdonell, 2010). Moreover, individual managers may experience ambidexterity tensions as they balance between exploitation and exploration. Each management level has a different role to play in exploratory innovation success with a particular set of behaviours (Kuratko, Ireland, & Hornsby, 2004; Miller & Camp, 1985). Perceptions of success also vary between various stakeholders (Davis, 2014; Mcleod & Macdonell 2010; Pankratz & Basten, 2014), yet alignment on goals and outcome-based metrics of success throughout the hierarchy is critical, to avoid risk-aversion due to agency issues (Eisenhardt, 1989; Freeman & Engel, 2007). Choosing the right outcome-based metrics in both exploitative and exploratory innovation projects may be hard but is especially so in exploratory projects because of inherent risk and uncertainty of outcomes (Freeman & Engel, 2007). Therefore, innovation-appropriate metrics not only need to be set but also need to be aligned between the principals and agents.

And, so it follows, that when it comes to risk-aversion, Agency Theory is of a higher interest to this thesis than Theory of Planned Behaviour and Prospect Theory.

While several authors mentioned above have studied managerial perception on topics of ambidexterity and project success, few have looked at project success in the context of ambidexterity or have applied a constructivist approach to explore how managers construe approaches used to drive to project success in that context. The latter being important in particular in new product development, where activities are complex, and knowledge is tacit (see Goffin & Koners, 2011). As follows from Kelly's basic postulate, the study of construing differs from study of perceptions, as the former offers an opportunity to shed light on managers' expectations of what would happen next and how they will act in similar circumstances with future projects.

PCT is not without criticism, yet it remains a respectable choice for understanding of individual construing (Chiari, 2013; Fransella, 1995). As described in section 2.5.5.1, the application of PCT may help predict how middle managers from Product Management and Engineering functions (see Cagan, 2017; Menguc & Auh, 2010; Owens & Fernandez, 2014) will act when faced with the next exploratory project.

In view of the above it follows, that understanding how middle managers at different levels and functions construe their situation in these complex and dynamic business environments, and what issues they find important with respect to leading exploitative and exploratory innovation projects to successful outcomes is of value to firms seeking to achieve superb financial performance (see Mitchell et al., 2007; Morandin & Bergami, 2014; Taylor, 2017; Thomas, Clark, & Gioia, 1993; Wrona, Ladwig, & Gunnesch, 2013). The research question, aim, and objectives described in the next section are designed to explore this gap.

2.6.2. Research Question, Aim, and Objectives

And so, this study aims to learn how middle managers at different levels construe exploitative and exploratory innovation projects with respect to techniques used to manage these projects towards the desired outcomes, and the metrics used to measure these outcomes. To achieve this aim, the empirical investigation of this study will address the following main question and the supporting question:

Main question: How do middle managers at different levels construe exploitative and exploratory innovation projects?

Supporting question: What issues do they construe as more important in achieving success of exploitative as opposed to exploratory innovation projects?

The following objectives have been set to achieve the aim of this study and answer the main question and supporting question:

1. to establish how middle managers construe exploitative and exploratory innovation projects;
2. to examine differences in construing and choices of approaches between the two middle management levels: strategic and tactical.
3. to examine differences in construing and choices of approaches between the two middle management functions: Engineering and Product Management.

3. Research Methodology & Design

3.1. Introduction

Chapter 2 culminated in positioning the research question in the gap shown by integration of the various literature fields. To answer this research question and to achieve the aim and objectives of this thesis, a methodology rooted in the phenomenological paradigm is developed and justified throughout this chapter. It is followed by the research design that applies the chosen methodology to two case companies.

3.2. Research Paradigm

Guba & Lincoln (1994) define a paradigm as

> "*the basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways*" (Guba & Lincoln, 1994, p. 105).

According to Jankowicz (2016), while a researcher may decide to mix qualitative and quantitative techniques (see discussion in section 3.3.1), epistemology does pose a choice as different epistemologies such as positivism and constructivism rely on different and contradictory ontological assumptions. The ontological difference stems from the way the data is interpreted. Positivist researchers seek to establish causal relationships among variables (Jankowicz, 2016), as they seek to establish probabilistic generalisations to form a system of laws (Harré, 1981). However, many of the issues dealt with in social sciences, and especially in management research, are more appropriately handled by avoiding a search for universal laws, which assumes that events exist "out there", independent of the observer, and better approached by focusing on meaning and understanding of these issues in a way that is agreed on by the social actors (Jankowicz, 2005; Patton, 2002; Patton & Appelbaum, 2003; Ritchie et al., 2014). Jankowicz (2005), argues there are several key reasons for this:

- problems dealt with by practitioners are typically complex and tend to be thought of in terms of 'issues' rather than 'variables', being better examined by constructivist epistemology, which is phenomenological in nature, as will be described in the next section in more detail;

- problems cross discipline boundaries and make it harder to choose a clear technique to be applied in a particular situation (also see the discussion on 'complex context' in section 2.4.1 above);
- the way professionals think of issues is not easily analysed using the hypothetico-deductive method with an assumption that problems and truth exist "out there", independent of the observer.

As the next section describes in detail, constructivist researchers are trying to understand the phenomenological positions taken by people being studied in social contexts (see Jankowicz, 2016; Patton & Appelbaum, 2003; Ritchie et al., 2014).

3.2.1. Phenomenology and Constructivism

Ritchie et al. (2014, p. 13) define phenomenology as an exploration of "*meaning people attach to a particular phenomenon, concept or idea*". In phenomenology

> "*knowledge is produced by exploring and understanding the social world of the people being studied, focusing on their meanings and interpretations*" (Ritchie et al., 2014, p. 12).

Understanding of a person stems from the understanding of their construing (see Kelly 1955, 1966), in other words, their understanding of the world. In turn, that knowledge leads to the understanding of the why people act the way they do (Butt & Burr, 2004). Kelly (1955) stresses the importance of events and assumes that "*all of our present interpretations of the universe are subject to revision or replacement*" (Kelly, 1955, p. 15).

According to Jankowicz (2016), constructivism is

> "*phenomenological and deals with issues as they are understood by both participants: the person being researched and the person doing the research. It seeks to invent understandings consistent with evidence*" (Jankowicz, 2016, p.101)

rather than discovering truths out there.

A constructivist researcher and the researched both attempt to "*make sense of events and data they have to deal with*" Jankowicz (2016, p. 4), with the research subject actively participating in the inquiry side of the research (Heron, 1981). This stance is consistent with

Kelly's claim that if a researcher to understand a subject, they "*must subsume the constructs of the subject rather than merely interpret his overt behaviour*" (Kelly, 1963, p. 174). Kelly (1963) goes further and claims that accounting for the researcher's own construction of what they observe, is what makes constructivism phenomenological in nature.

Phenomenology has been relied on as a paradigm of choice by researchers to understand perceptions of individuals on a particular issue (Cullina 2016; Jankowicz, 2001; Malmström, Johansson, & Wincent, 2015; Pankratz & Basten 2011, 2017; Quirk, 2013; Wachira, 2013).

As presented in the argument development (see section 2.6.1), this research has an opportunity to add to findings of authors who looked at managerial perceptions on ambidexterity and project success by using PCT with Repertory Grid Technique (see section 3.4) to learn how managers construe exploratory innovation projects, and how their roles, levels, and experiences influence their construing and choice of approaches used to manage these projects. Additionally, applying PCT to this research offers an opportunity to explore the anticipatory aspect of personal constructs, and, as described in section 2.6.1, offer insight into managers' expectations of what would happen next, and what actions they are likely to take in future projects.

Answering the research question in this thesis required the author to actively engage with the participants and interpret their construing of issues this question explores. The inquiry into middle managers' cognition in the context of this question is aligned with epistemological assumptions of PCT as described above and in the introduction to PCT in section 2.5.5.

Constructionism, an epistemology that postulates that we invent beliefs based on social relationships, cultural contexts, linguistics and communication patterns (Raskin, 2002) was considered as an epistemological alternative to constructivism. Constructivism was deemed more appropriate given the research questions as it is the individuals and their personal understanding of reality that are of interest in the present research.

3.3. Research Method

3.3.1. Qualitative – Quantitative Distinction

While mainstream literature on research methods tends to make a distinction between qualitative research and quantitative research (e.g. Merriam, 1998; Ritchie et al., 2014; Yin, 2017), such distinction may be rather simplistic, and may not address the key differences

between paradigms, methods, and techniques (see Bennet, 1991; Jankowicz, 2016). The term 'qualitative' is often used in that literature as an umbrella term for various non-positivist paradigms (Guba & Lincoln, 1994). Bennett (1991) differentiates between methods and techniques, clarifying that methods deal with "what" we do and "why" we do it, whereas techniques deal with "how" we are going to do it. Jonker & Pennink (2010) also make a distinction between these concepts, clarifying that methods are specific actions or phases a research goes through, whereas techniques are tools used by the researcher to collect and analyse the data. This author finds this distinction helpful and distinguishes between the methods and techniques in the material presented in this chapter, keeping in mind that one may use qualitative techniques, quantitative techniques, and often a combination of both, as is the case with the Repertory Grid Technique used in this thesis and described in detail in section 3.4.

3.3.2. The Case Study Method

Bennett (1991) claims that more qualitative and exploratory in nature methods are appropriate for situations where little is known about the nature of variables involved in the issue at hand, as is the case with the topic of this research. Yin (2017) compares several methods and indicates that case studies are well suited for answering "how" and why" questions, and can be used for three purposes: exploratory, descriptive, and explanatory, with an in-depth focus on a case. Merriam (1998) argues that case studies stand out among other methods to provide "intensive descriptions and analysis" of units such as organisations and individuals. Exploring people's perspectives in a particular context is one of the primary features of a case study (Ritchie et al., 2014; Yin, 2017). In their multiple-case study of radical innovation project management in large corporations in various industries, Leifer et al. (2000, p. IX) build on Yin's point, and emphasise that "how" and "why" questions "*are designed to push the envelope of thinking of practitioners and academics about a very difficult subject*". Patton & Appelbaum (2003) quote several sources in support of this view, suggesting that complex organisational issues are to be researched in a comprehensive way with the help of case studies. The distinctive advantage of the case study method over other methods comes from its reliance on multiple techniques in order to integrate different perspectives on a complex issue, and as a result build an in-depth understanding of that issue (Holtzhausen, 2001; Ritchie et al., 2014). The reliance of different techniques using different

sources of information to verify the findings is known as triangulation (Ritchie et al., 2014; Yin, 2017).

The Basis to be Used for Generalisation

Historically, case studies have not been popular in research and came under heavy criticism from positivist researchers (Patton & Appelbaum, 2003). Two main claims against case studies were (a) lack of rigour and (b) lack of generalisation to population (Patton & Appelbaum, 2003).

Bennett (1991, p. 88) argues that rigour is contextual to the research and has to meet its own objectives and needs. For example, the rigour in the experimental method is achieved by control of moderator variables, whereas the case study method is phenomenological in nature, focused on a rich description from a variety of data sources, and rigour is achieved by analytic generalisation and triangulation (see Yin, 2017). Also, while positivist methods may be thought of as having higher rigour thanks to the perceived lack of bias, they too have proven to suffer from bias (Patton & Appelbaum, 2003). Ironically, the supposed source of bias in phenomenological methods – the researcher and their interpretation of the data – is the strength of the case study method (Patton, 2002; Patton & Appelbaum, 2003; Merriam, 1998; Ritchie et al., 2014). This stance is aligned with Heron (1981) and with Kelly's sociality corollary described in section 2.5.5.1 and is crucial for the researcher as they attempt to construe the interviewee's understanding of issues and events (see Jankowicz, 2016).

According to Yin (2017) case studies do not seek to generalise findings to population - statistical generalisation typically suited for surveys and experiments. Instead, Yin claims,

> "*rather than thinking about your case(s) as a sample, you should think of your case study as an opportunity to shed empirical light on some theoretical concepts or principles*" Yin (2017, p. 37).

And so, the form of generalisation sought in a case study is called 'analytic generalisation' (Yin, 2017, p. 37). Its aim is to generalise from the study (not the case) to a variety of situations, in which the same theoretical concepts or principles apply. Bryman and Bell (2015) explain that analytic generalization is similar to theoretical generalization in that it "*refers to credibility of the theoretical inferences that the researcher draws from his or her findings*" Bryman and Bell (2015, p.437).

Section 3.5.2 will discuss a sampling approach that is more appropriate to studies aiming at analytic generalization.

Exploratory Approach

As discussed in section 2.6, the research question is dealing with a complex issue, and little is known on the topic. Managerial construing of issues of ambidexterity and choice of approaches can be classified as 'tacit knowledge' (see Nonaka & Konno, 1998) with some evidence of attempts to make it explicit (e.g.Goffin & Koners, 2011; Pankratz & Basten, 2014). Therefore, an exploratory case study was chosen to examine the cognitive dimension of the tacit knowledge of social actors (managers) as they ascribe meaning to exploratory projects, techniques used, project outcomes and metrics in the context of ambidexterity. Similar to Pankratz & Basten (2014) and Jankowicz (2001), this research aims at transforming the tacit knowledge on a subject into explicit with the use of Repertory Grid Technique (see section 3.4) and extends their findings to the realm of exploratory innovation projects in the context of ambidexterity. Case study approach has been used by researchers on topics of ambidexterity (Bonesso et al., 2014), exploratory innovation (Kristiansen & Ritala, 2018; O'Connor & Rice, 2013), project outcomes (Pankratz & Basten, 2014), and sensemaking (Goffin & Koners, 2011; Gough, 2014).

Reliability

Reliability in the case study method is achieved through a carefully documented and detailed study protocol (Eisenhardt, 1989a; Yin, 2017), which helps to minimise errors, and, in theory, would allow another researcher to repeat the same case study and to arrive at the same findings. As described later in this chapter, the Repertory Grid Technique used in this study relies on well-documented, rigorous data collection and analysis techniques, which include an explicit reliability assessment of agreement between two researchers.

Researcher Bias

To address the researcher bias concerns and ensure the construct validity of the study, triangulation technique – reliance on multiple sources of evidence (Ritchie et al., 2014; Yin, 2017) – was used to examine and elaborate the interview-based findings. In this research, the author has examined the interpretation of the findings with interviewees (see Meriam, 1998), to validate the findings. This was done with the help of Key Informant Interviews (see Tremblay, 1957) in stage two of the main study as described in section 3.4.2. As discussed in

the next section, the Repertory Grid Technique is known to reduce the researcher bias as well, as it helps capture the interviewee's constructs in their own terms (Jankowicz, 2004).

3.4. Research Techniques

The empirical work has been conducted over three stages: a pilot study, and two stages of the main study.

The goal of the pilot study has been to test the logistical aspects of the inquiry (see Yin, 2017), and estimate the target sample size. Pilot study design is discussed in more detail in Chapter 4.

The main study has been divided into two stages (see Gough, 2014; Sitte, 2015):

Stage 1: semi-structured interviews have been conducted using the Repertory Grid Technique (see section 3.4.1) to collect and analyse the main body of data.

Stage 2: Key Informant interviews have been conducted to examine and elaborate the findings of stage 1 (see section 3.4.2).

3.4.1. Repertory Grid

3.4.1.1. Introduction

Among the various techniques at a case study researcher's disposal are interviews, questionnaires, focus groups, direct and participant observations, and mining data from documents, with interviews being the most common technique (Merriam, 1998; Patton, 2002; Yin, 2017), and multiple techniques being used in the course of a study to increase the internal validity through triangulation (Yin, 2017).

Researchers looking to study perceptions, or personal constructs of people regarding a particular issue in a business setting often use Repertory Grid Technique (RGT) (see Cullina, 2016; Goffin & Koners, 2011; Gough, 2014; Hisrich & Jankowicz, 1990; Honey, 1979a,1979b; Pankratz & Basten, 2014; Napier et al., 2009; Wachira, 2013). Goffin et al. (2012) demonstrate how the application of RGT leads to more meaningful constructs as compared to a more direct questioning interview technique. While RGT is the most common technique used for construct identification, other techniques such as 'sentence completion',

'free choice profiling', and 'self-characterisation' may lead to elicitation of personal constructs similar to the results obtained through RGT elicitation (see Denicolo, 2003; Höft, Heckmann & Jankowicz, 2019).

Repertory Grid is not as popular in qualitative research as the traditional structured or semi-structured interview, yet it has gained popularity across a variety of fields (see Saúl, 2012). According to Saúl (2012), 468 journal papers, 335 book chapters, 108 doctoral theses, and 62 books were published on studies using RGT between the years 1998 and 2007, with business administration being one of the more prominent topics outside of the field of psychology (p. 123). Cornelius (2015) supports this view and cites close to 50 articles relying on RGT, published between 1979 and 2013 focused on topics such as organizational studies, management, organizational learning and change, and entrepreneurship.

RGT has evolved from Kelly's Personal Construct Theory and is a particular interviewing technique that allows a researcher to elicit personal constructs about a certain issue from participants (Bell, 2003; Fransella, 2003; Fransella et al., 2004; Jankowicz, 2004; Tan & Hunter, 2002). It involves the definition of elements, elicitation of constructs that contrast these elements, and relating the elements to the elicited constructs (Bell, 2003; Fransella et al., 2004).

In Kelly's terms, a construct is *"a way in which some things are constructed as being alike and yet different from others*" (Kelly, 1963, p. 105), and elements are defined thus "*The things or events which are abstracted by a construct are called elements*" (Kelly, 1963, p. 137).

As presented in section 2.5.5.1, Kelly's fundamental postulate states "*a person's processes are psychologically channelized by the ways in which he anticipates events*" (Kelly, 1966, p.7). According to Bell (2003, p. 95), RGT flows directly from this postulate, where the *ways* are the constructs, and the *events* are the elements. In Kelly's own words:

> "*In construing, the person notes features in a series of elements which characterize some of the elements and are particularly uncharacteristic of others. Thus, he erects constructs of similarity and contrast.*" (Kelly, 1963, p. 50)

Figure 7 below is an example of a portion of a grid sheet as generally used in PCP research, with elements and constructs as its key attributes.

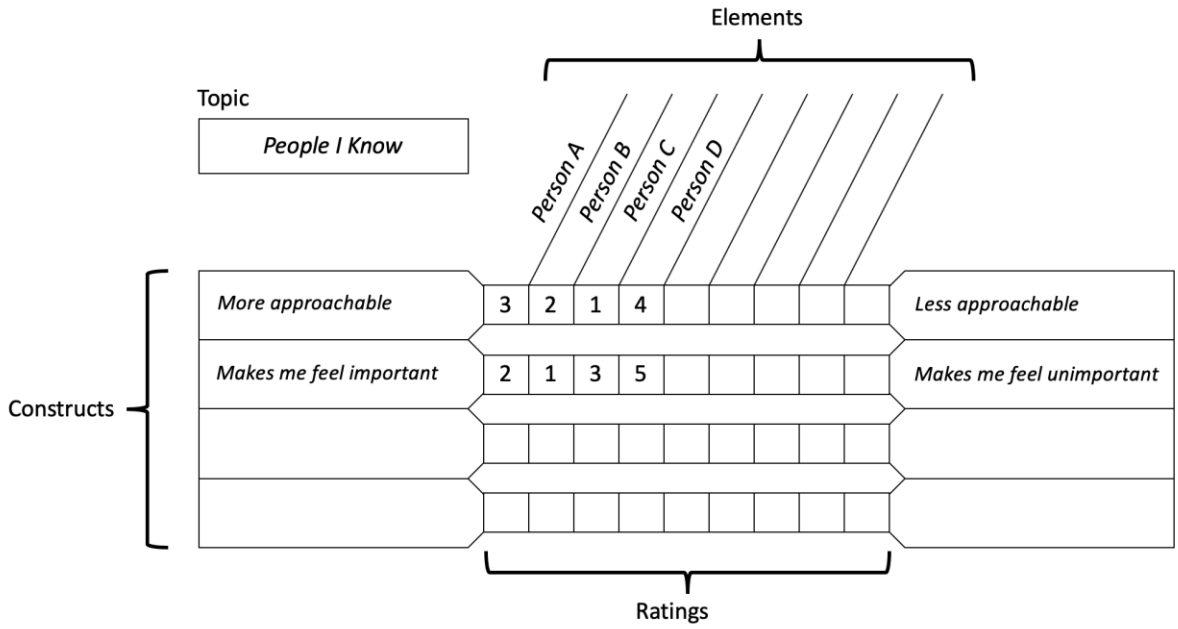


Figure 7. Repertory Grid and its key attributes.
Source: adapted from Fransella et al. (2004).

In the example presented in Figure 7 above, elements are rated on a 5-point scale, where the phrase on the left (the emergent pole of the construct) anchors the '1' end of the scale and the phrase on the right (the implicit pole of the construct) anchors the '5' end of the scale. For instance, in the first construct, the interviewee construes Person C as more approachable than person A. To emphasise, a single construct consists of two contrasting poles, conveying a single meaning, as follows from the choice corollary (see section 2.5.5.1).

Figure 8 below provides an actual example taken from one of the pilot study responses (see Appendix 1b). This sample includes eight elements: three exploratory projects, three exploitative projects supplied by a participant, as well as two "ideal" projects supplied by the author.

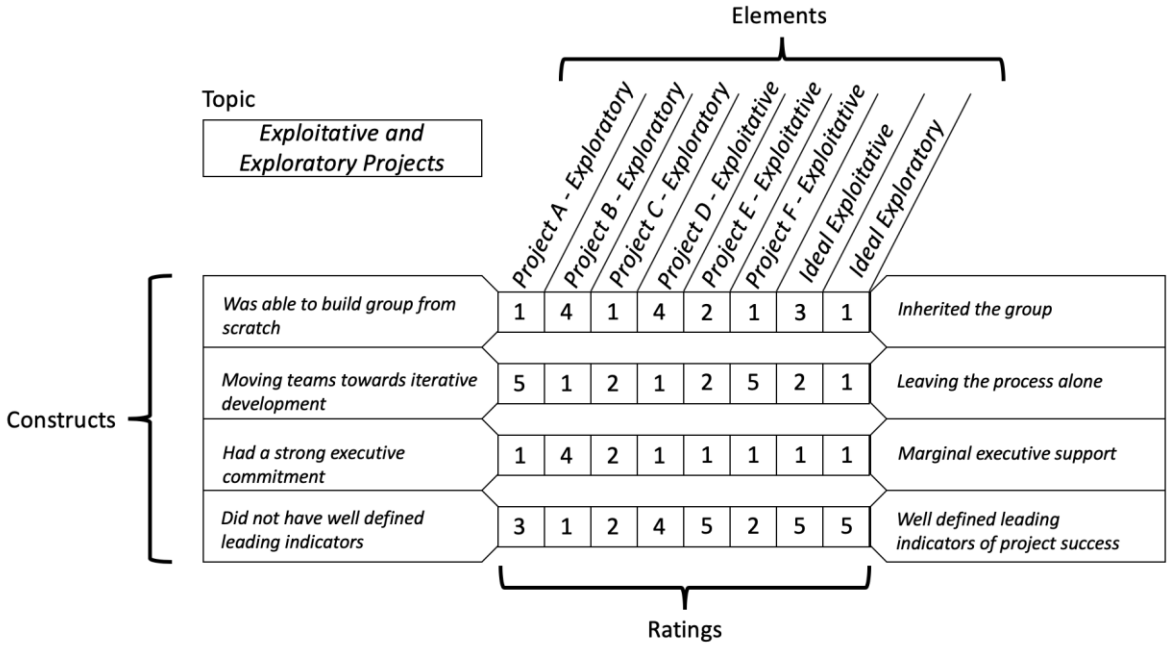


Figure 8. Repertory Grid sample of pilot study data.
Source: Author

RGT helps prevent researcher bias (Cullina, 2016; Easterby-Smith & Aston, 1975; Pankratz & Basten, 2014; Quirk, 2013), and the status-quo bias of individuals being researched (see Pankratz & Basten, 2014). The benefit here is that an interviewee is not asked to work with constructs and frameworks developed by the researcher as is the case with typical structured and even semi-structured interviews (see Jankowicz, 2004). Instead, the grid elicits the interviewee's own constructs (Bell, 2003) as illustrated in figures 7 and 8 above.

RGT interview was the key technique for this research, and the next section provides more details on the grid design and elicitation procedure specific to this research.

3.4.1.2. Repertory Grid Procedure

Elements are typically instances or exemplars of the topic being covered in the interview (e.g. people, projects, cars, books) (Bell, 2003; Pankratz & Basten, 2014), and are better to be expressed as nouns rather than verbs that describe related activities (Jankowicz, 2004). The topic of this grid is "exploratory and exploitative projects". There are two main ways in which elements can be selected for a grid: the researcher supplies the elements, or the

participant does (Bell, 2003; Jankowicz, 2004; Tan & Hunter, 2002). A variant of these two main techniques was adopted for this research, where the researcher asked the participant to name instances of a particular category where categories were supplied by the researcher. This way, the researcher had the benefit of alignment for the subsequent multiple-grid analysis, while the participant named the actual elements that they cared about (Bell, 2003; Pankratz & Basten, 2014).

As exemplified in Figure 7 above, each grid was structured to include six elements plus two 'Ideal' elements. The participants were asked to name three incremental innovation projects (exploitative), and three projects aimed at new product development for new and existing markets (exploratory). Two 'Ideal' elements were supplied (see Fransella, 2003): 'Ideal Exploratory Project' and 'Ideal Exploitative Project'. This allowed the author to compare how the projects being discussed differed from the ideally managed project from the interviewee's point of view, in terms of approaches used to manage these projects.

To facilitate analysis across grids from multiple respondents, the researcher may supply a summary construct to establish the interviewee's stance on a particular issue. The following summary construct has been supplied at the beginning of the interview, and then reviewed again at the end of the interview:

"*Overall, approaches used were more effective for project success vs. Overall, approaches used were less effective for project success*".

A standard form of grid procedure (see Bell, 2003; Fransella et al., 2004; Jankowicz, 2004; Pankratz & Basten, 2014) has been used as outlined below.

At the beginning of the interview, participants were briefed on the purpose of the interview and were asked to name a number of exploitative and exploratory projects, thereby setting the 'range of convenience' (Kelly, 1963, pp. 68-72) of interviewees constructs. Once these projects were recorded as elements in the grid, the researcher picked three projects at a time for a 'triadic comparison' and asked the interviewee to explain in what way two of them are similar but different from the third one. The response expressed as a two-pole construct was recorded in the grid. An example can be seen in Figure 8 above:

"Had a strong executive commitment" vs. "Marginal executive support"

In accordance with RGT, a technique called 'Laddering Down' was used, if the participant responded with an overly simple construct. With that technique, the researcher asks "*in what*

way?" to help the participant to arrive at a more specific construct. Once the construct was elicited and the robust poles were recorded in the grid, the participant was asked to rate all the elements on a scale from 1 to 5, and the results were recorded in the grid.

Each construct was coded with a unique identifier to aid the subsequent content analysis, indicating the company, level, function, interviewee sequence, and the construct's sequence from a particular grid.

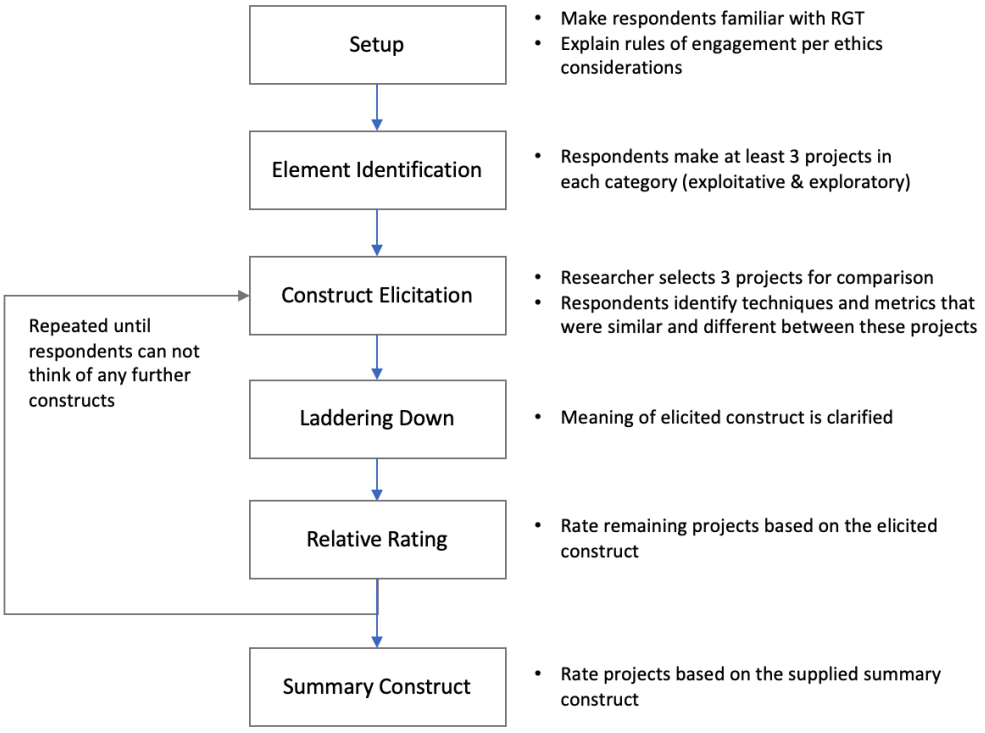


Figure 9. Application of RGT with Laddering Down.
Source: Adapted from Pankratz & Basten (2014).

The constructs were elicited by using the phrase below, with the qualifying phrase emphasized in bold letters. The qualifying phrase helps establish focus for the interviewee's responses.

"*Which two projects are similar in some way, but different from the third,* ***in terms of what approaches make for effective management of these projects?***"

Remote Administration of RGT

As described in section 3.5, both companies participating in the study are multi-national with offices around the globe. While this author had multiple opportunities to meet the

participants face to face through frequent national and international travel, some qualified participants resided in offices outside of the author's reach with respect to timing and cost constraints. In these cases, the interview was conducted with help of video conferencing service with screen sharing capabilities: GoToMeeting (https://www.gotomeeting.com/). The author had a full-featured access to this software through his employer. A similar approach was taken by Magni (2010) in an organizational setting, where it was not practical to meet face to face with a respondent. Magni's sample, although small (8 respondents from the 12 who did the remote grid), found the experience user-friendly, interesting and engaging.

3.4.1.3. Repertory Grid Analysis

A repertory grid contains information about one person's construing as captured by qualitative data (the meaning expressed by each construct) and quantitative data (the way elements are construed, as indicated by ratings on each construct). A typical approach to analysis of this data across multiple grids is twofold:

a) to aggregate the meanings present in the sample as a whole by means of content analysis (Jankowicz, 2004; Tan & Hunter, 2002), while

b) retaining two personal attributes: the personal importance of the constructs to the individuals providing them, by means of Honey's technique (see Honey, 1979a, 1979b), and providing information about the cognitive complexity of the individuals' construing.

The Content Analysis

According to Ritchie et al. (2014), content analysis involves the analysis of both the content and context, where themes or categories are identified, and the frequency of constructs in each category is presented. Bryman & Bell (2015) argue that content analysis has an advantage of being transparent in its approach and flexible in that it can be applied to variety of content.

And so, a content analysis of meanings present in a group of grids was the main analysis technique following the basic approach as outlined by Krippendorff (2004) and Saldaña (2009), and followed a similar approach used by Cullina, (2016) and Goffin & Koners (2011) in similar circumstances. According to Jankowicz (2004), a typical content analysis of

repertory grid material involves a single-level analysis, where each construct is allocated to just one category, with the categories being mutually exclusive and completely exhaustive.

As described in sections 3.5.1 and 3.5.2, two companies were included in this research to satisfy the requirement for sufficient number of constructs. The data from both companies is pooled for content analysis. A 'First Cycle' coding (see Saldaña, 2009) was done, followed by single-level content analysis (Krippendorff, 2004).

As discussed earlier, managers at different levels may have different perceptions of success (Davis, 2014; Mcleod & Macdonell 2010; Pankratz & Basten, 2014), and different perceptions of ambidexterity (Raisch et al., 2009). Therefore, it was of interest to group the respondents based on their levels and look for an indication in the relative importance of the categories of similarities among the respondents at the same level and how it differs from respondents at other levels. Janckowicz (2004) calls this procedure 'differential analysis'. For the purpose of this analysis, the managers were stratified into two groups: strategic (VPs, Sr. Directors) and tactical (Managers, Sr. Managers, Directors), as described in section 3.5.2, to compare how construing of projects by managers in the strategic group differed from that of managers in the tactical group, and to explore the differences between construing of exploitative versus exploratory projects.

Both the coding and the analysis have been manual processes and did not involve software packages such as NVivo.

Reliability Check

A colleague of the researcher has repeated the procedure as part of a reliability check, with the goal of achieving higher than 90% agreement between the researchers on categorization of constructs, and on coding to those constructs hence indicating that categorization is meaningful more than to a single researcher. %Agreement score may be a sufficient method to check the agreement if number of constructs is high and probability of chance agreement is low, however, some more robust indices exist which account for chance agreement as described next. Cohen's Kappa adjusts the level of agreement to take into account the level one could expect by chance given the number of categories, and Perreault-Leigh which takes into account the nature of the agreement given the separate researchers' judgements that coincide by chance and judgements that do not (see Perrault & Leigh, 1989).

Personal Construct Importance: Maintaining Provenance of Individual Ratings

While content analysis is key for multiple grid analysis, it has a drawback, in that it ignores the ratings collected in each grid. The personal importance of the constructs prior to the aggregation provided by a content analysis can be identified by Honey's technique (Honey, 1979a, 1979b). This uses a supplied 'summary construct' that establishes the participants' overall stance on the topic of the grid. Honey's analysis computes a **% Similarity Score** between

a) each of an individual's construct ratings, and

b) that individual's own ratings on the 'summary construct' – the overall issue at hand.

$$\%\text{Similarity} = \mathbf{100} - \frac{(\mathbf{100}.\sum \boldsymbol{d})}{(\boldsymbol{r}-\mathbf{1}).\boldsymbol{e}}$$

Where $\sum \boldsymbol{d}$ is the sum of absolute differences between ratings, $\boldsymbol{r}$ is the maximum possible rating, and $\boldsymbol{e}$ is the number of elements in the grid.

This approach allows a researcher to analyse constructs across the entire sample yet preserve the idiosyncrasies expressed in the individual grids.

Each respondent provided their own constructs and ratings and these were categorised in the content analysis, the frequency of each category giving an impression of the relative importance of the different categories in the sample as a whole; while the %Similarity Scores, being based on each respondent's own overall summary ratings, provided an indication of which of the individual's constructs matter most to that individual when he or she construes the overall issue at hand. In addition to the %Similarity score, it is customary to indicate the H-I-L index, specifying whether the %Similarity score is placed high (H), intermediate (I), or low (L) for that particular individual (Honey, 1979a, 1979b; Jankowicz, 2004). As a result, it is possible for two individuals to have constructs marked as high (H) while %Similarity score might be in 70% range for one individual's construct and 90% for another's.

It is imperative to clarify the notion of construct importance in the context of this thesis. Some early literature (Myers & Alpert, 1968, 1976) stresses the multi-dimensional nature of the term importance and offers a definition of importance as well as of terms closely related to it:

1. **Salience**: refers to the extent to which attributes are top of mind to an individual thinking about a particular topic (in the context of their paper: a product) and would be reflected in the order the constructs are elicited. As Heckmann et al. (2019) indicate, prior studies relying on RGT did not reach a definitive conclusion on whether order of elicited constructs indicates relative importance of constructs, except for situations where a grid's topic is person-related.

2. **Importance**: refers to the extent to which something is of significance and consequence when making a choice (in the context of their paper: when deciding which product or brand is more superior). Van Ittersum et al. (2007) elaborates further and refers to Myers & Alpert definition of importance as 'relevance' which is based on personal preferences. In the context of the RGT this relevance would reflect the relative importance of constructs with respect to the overall topic of the grid.

3. **Determinance**: refers to an additional characteristic of decision making, where an attribute maybe important on its own, but not sufficient for making a decision (in the context of their paper: when making a purchasing decision among multiple products being evaluated).

Unfortunately, neither Myers & Alpert (1968, 1976) nor Van Ittersum et al. (2007) have referenced Kelly's PCT. In fact, the methods reviewed by Van Ittersum et al. (2007) with respect to measuring importance rely on scales provided to the interviewee by a researcher. In this author's opinion, RGT is substantially superior to the methods reviewed thanks to its reliance on the constructs provided by the interviewee on a particular concrete topic and operationalized through careful 'Laddering down' and negotiation between the researcher and an interviewee.

Moreover, Honey's technique described above measures the relative importance of constructs by comparing their ratings with those of the 'overall construct', and hence is more consistent with the 'importance' definition given in item 2 above. For consistency, when referencing the relative construct importance to an individual in this thesis, the term 'importance' is used henceforth and is most closely based on the definition of that term by Myers & Alpert (1976).

Rojon et al. (2019) corroborates the stance taken by Jankowicz (2004) and argues that Honey's technique does not compromise the individual grid's data granularity, and allows for cross-grid analysis, while conforming to the epistemological stance the RGT is based on.

Höft, Heckmann, & Jankowicz (2019) evaluated a novel approach to improving the content analysis outcomes through colour-coding of constructs based on their %Similarity scores. This approach helps address situations where respondents use similar terminology for different constructs or use different terminology for the same constructs. The risk of encountering this situation was considered low assuming respondents are likely to share a similar, relatively confined range of discourse, what Jankowicz (2003) refers to as 'localized discourse'. Additionally, ambiguity of construct meanings in the present research was removed by carefully applying the technique of 'Laddering Down' (see section 3.4.1.2).

Cognitive Complexity

Cognitive complexity is of interest in the context of research on innovation and entrepreneurship, in relation to cognitive ambidexterity as argued in sections 2.5.1 and 2.5.4. Further, cognitive complexity may influence the flexibility with which issues are construed and re-construed (see section 2.5.5.3).

Since the approach chosen for content analysis is that of meanings expressed across the sample (as opposed to cluster analysis), Principal Component Analysis was used as an indicator of the complexity of a single repertory grid, as computed using the RepPlus package (Gaines & Shaw, 2018), the key indicator being the proportion of variance in the grid that is accounted for by the first two principal components. The greater the cumulative variance accounted for by the first two components, the lower the cognitive complexity: in other words, the individual has relatively few distinct ways of thinking about an issue. Conversely, the lower the cumulative variance, the higher the cognitive complexity.

Table 9. Principal Component Analysis example

Respondent	**Variance**	**Components**							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
ATPI-3	Variance %	74.45	11.58	7.31	3.82	1.95	0.77	0.13	0.00
	Cumulative Variance %	**74.45**	**86.03**	**93.34**	**97.16**	**99.11**	**99.87**	**100.00**	**100.00**
BSPX-11	Variance %	31.12	26.79	15.74	12.41	7.69	3.41	2.83	0.00
	Cumulative Variance %	**31.12**	**57.92**	**73.66**	**86.07**	**93.76**	**97.17**	**100.00**	**100.00**

Table 9 shows PCA output from the RepPlus package for two respondents. The cumulative variance percentage accounted for by the first two components is the highest in the sample for respondent ATPI-3 (86.03%) and the lowest in the sample for respondent BSPX-11 (57.92%). This indicates that respondent ATPI-3 has the lowest cognitive complexity in the sample, and respondent BSPX-11– the highest (with respect to the particular issue being studied). See Appendix 1c and 1d for grids solicited from these two respondents.

3.4.2. A Stance Towards Triangulation

3.4.2.1. Introduction

The importance of triangulation in the case study research has been discussed in sections 3.4.1 and 3.3.2. According to Ritchie et al. (2014, p. 45), triangulation "*involves the use of different methods and sources to check the integrity of, or extend, inferences drawn from the data"*. The Repertory Grid procedure itself includes a kind of triangulation, as the constructs are arrived at through negotiation between the researcher and the participant. An additional triangulation occurs when at the end of the interview ratings for individual elements are compared with ratings for 'ideal' elements (see section 3.4.1.2), and a respondent is asked to confirm whether what appears to be the closest/furthest element to the ideal is indeed closest/furthest. Researchers relying on constructivism (and drawing on PCT in particular) often rely on collaborative inquiry (Denicolo et al., 2016; Jankowicz, 2004), where a subject

is treated as co-researcher by actively participating in the inquiry side of the research (see Heron, 1981).

Once the data has been collected and analysed using the Repertory Grid technique as described in prior sections, the findings can be examined and elaborated using a second technique. This is considered to be a methodological triangulation (see Ritchie et al., 2014; Yin, 2017), which, in the terminology clarified in section 3.3.1, simply means use of multiple techniques within the context of the same paradigm and method to increase the construct validity (see Yin, 2017) of the study. Denicolo et al. (2016) offers several recent examples of follow up interviews as an example of collaborative inquiry aimed at joint interpretation of data elicited with RGT.

3.4.2.2. Key Informant Interviews Procedure

The goal of triangulation in this research is to validate and elaborate the researcher's interpretation of the data collected in stage 1 of the main study. According to Tremblay (1957), the Key Informant Interview technique can be used to shed light on how issues are understood by practitioners in a specific organisational setting, based on practitioners' personal experience, and to help a researcher understand the issues that arise in the research.

Tremblay argues that this particular use of key informants differs from its use in an ethnographic study (see for example Arce & Araujo, 2017), in that it seeks to focus on specific issues that arise from an earlier study, and therefore seeks a few key informants with a specialized knowledge, who might be able to shed more light on the issue in question. For example, in their study on new product development, Smeilus & Pollard (2016) interviewed key informants in the second stage of their study to refine a model developed based on findings from the first stage.

Yin (2017) argues that in a case study, interviews resemble guided conversations. The intent of these in-depth conversations was to examine in more detail the findings from the construct and element analyses (see section 3.4.1.3).

Two approaches were considered for conducting the semi-structured interviews. In the first approach, informants would be guided through a series of questions aimed at arriving at data to be used for comparison with findings from the stage 1 of the study. Alternatively, informants would be presented with the stage 1 findings, and would be asked to help interpret

these findings. Merriam (1998) and Yin (2017) argue that this type of validation with participants is an important triangulation method in a case study. This latter approach was chosen as more consistent with the Kellian philosophical stance, with the goal to examine the key informants' thinking about results that are there, established, and of known reliability, to draw on their sensemaking about the results. Respondents were shown simplified tables from this thesis, exemplifying the points of discussion around the emergent findings (see Appendix 13). This collaborative approach (see Heron, 1981) helped explore how informants understand what's going on, and what they see as the implications for their organizations.

3.4.2.3. Key Informant Interviews Analysis

Informants' perspectives on the issues examined were captured and recorded in a role-ordered matrix (see Miles & Huberman, 1994; Miles et al., 2019). According to Miles et al. (2019, p. 157), this kind of presentation *"systematically permits comparisons across roles on issues of interest to a study, and tests whether people in the same role see issues in comparable ways".*

This matrix helped present and analyse relationships between an informant's stance on an issue identified in stage 1 of the study, and their role, allowing for comparisons within a role and between roles. According to Miles & Huberman (1994, p. 122), "*a role is a complex of expectations and behaviours that make up what you do, and should do, as a certain actor in a setting*".

The analysis then proceeded with search for patterns to identify:

(a) to what extent did informants with similar roles, experiences, or organizations agree on issues involved;

(b) to what extent their individual views varied based on their roles, experiences, or organizations.

3.5. Case Companies and Sampling

3.5.1. Organisations Participating in Research

Two case companies proposed for this research are the author's employer (Company A) and another LHTC (Company B), with whom the author has an established relationship through

partnership in a joint corporate start-up accelerator between Company A and Company B. As can be seen in Table 10 below, both companies have many similarities in terms of age, size, number of employees, financial performance, and market leadership. Both companies have a history of bringing new products to new and existing markets through exploration organically, and an evidence of corporate innovation programs aimed at the development of new products. It is unclear at this point whether ambidexterity is a deliberate strategy for these companies, and as described in section 2.2.3.2, strategy formation rarely is completely deliberate or emergent.

Table 10. Companies participating in research. Source: Morningstar, n.d.

Characteristic/Indicator	**Company A**	**Company B**
Fortune 1000	Yes	Yes
Founded	Late 80s	Early 90s
Focus	Secure productivity solutions	Open source software products
Employees	~10,000	~10,000
Market Cap	~$12 billion	~25 billion
5-year revenue average	~$3 billion	~$2 billion
Gross Margin	~85%	~85%
Operating Margin	~20%	~14%
R&D Spend Ratio	~15%	~20%

Both companies are consistently recognised as leaders in their respective markets by analysts such as Gartner and Forrester.

It is important to clarify the reasoning for choosing two case companies. The design is not that of replication of findings across the two companies. The author recognized the challenge of finding participants with experience of leading both exploitative and exploratory projects in a single company. Therefore, Company B was included in this study to ensure that a sufficient number of interviewees with relevant experiences could be sampled and a sufficient number of constructs for the content analysis could be collected as described in section 3.5.2.

3.5.2. Sampling within the Case Companies

3.5.2.1. Sampling for Stage 1

Probability sampling, while most rigorous according to positivist researchers, would not be appropriate for most qualitative research (Ritchie et al., 2014) as it aims to aid with generalization from sample to population. Purposive sampling is popular in qualitative research as it allows a researcher to gain the most insight, with its focus on participants with a particular background and expertise (Merriam, 1998). This is particularly applicable to this research as perceptions of middle managers who led both exploitative and exploratory innovation projects are being explored. Additionally, research aiming at analytic generalization (see section 3.3.2) is more appropriately supported by purposive sampling (see Denicolo et al., 2016).

A typical purposive sample (Merriam, 1998) was used for this research, focusing on middle managers who were leading or have previously led both exploratory and exploitative innovation projects. The sample was limited to managers in Product Management and Engineering functions, as managers in these functions are ultimately responsible for defining and releasing products in LHTCs (see section 2.3.1). One of the key benefits of exploring the construing of managers is the ability to predict how managers will approach the future projects thanks to the anticipatory nature of construing (see section 2.5.5.1). Therefore, it was not considered a hard requirement to have had the experience with the six projects (three exploitative, three exploratory) in the current company, but overall, experience with both type of projects was considered a hard requirement for participant selection.

The first set of interviewees were identified as follows: in Company A the author has approached the individuals matching the profile described above, based on the author's own interactions and observations from the last five years in Company A; in Company B the first introductions were made by the author's contact from the executive leadership team, making sure that the participants match the same profile.

Two groups of middle managers were identified to provide contrast between the various middle-management levels following the argument developed in section 2.6.1. According to Mitrzberg (1989), middle managers are those who operate between the 'strategic apex' and the 'operating core' – stance that is supported by Huy (2001) and Harding (2014). Therefore, the first group consisted of functional VPs and Senior Directors – those operating closer to the 'strategic apex', participating in strategy formation, and spearheading its implementation;

the second group consisted of Directors, Sr. Managers, and Managers – those operating closer to the 'operating core' and overseeing the projects contributing to strategy implementation. For the remainder of this thesis, the former group will be labelled as 'strategic group' and the latter as 'tactical group'.

Purposive sampling is common for studies in the realm of ambidexterity (see Bonesso et al., 2014; Lubatkin et al., 2006; Papachroni, 2013) and project success perceptions (see Agarwal & Rathod, 2006; Pankratz & Basten, 2014, 2017).

According to Merriam (1998), the data collection continues until saturation occurs, that is, when no new insights are coming out of the interviews. In the context of Repertory Grid technique and considering the content analysis that follows (see section 3.4.1.3), the saturation occurs when new constructs obtained do not change the proportion of constructs across the categories.

While it may be impossible to set the sample size ahead of time in a purposive sampling scenario (Merriam, 1998), Ritchie et al. (2014) cite several authors recommending a range between 12 to 50 sample size. According to Jankowicz (2004), with the constructivist approach utilizing the Repertory Grid Technique, what matters is the number of constructs solicited from interviewees for the purposes of content analysis, rather than the number of interviewees. This is because the units of analysis are constructs. He argues that an hour-long interview may result in between 7 and 12 constructs, and that some 300 constructs may be required to achieve sufficient saturation for a comparison between the two groups. This corroborates the suggestion by Tan & Hunter (2002) that a sample of 15 to 25 Repertory Grid interviews is typically enough to generate sufficient constructs.

There are two compatible RGT-based studies worth mentioning with respect to sample size estimation. Pankratz & Basten (2014) – the study my thesis is modelled after - relied on a purposive pooled sample of 11 participants across three companies to study the project managers' construing on topic of project success. Rojon et al. (2019) interviewed a purposive pooled sample of 25 participants from multiple companies to study a management phenomenon of conceptualization of workplace performance behaviours.

As follows from the above, the author anticipated the range to be between 10 and 15 interviewees per case company, as is also confirmed by the pilot study discussed in chapter 4.

3.5.2.2. Sampling for Stage 2

As described in section 3.4.2, the goal of stage 2 of this study was to examine and elaborate findings of stage 1 with key informants. According to Tremblay (1957), the key criterion for informant selection and eligibility to participate in the interviews is exposure to the kind of information being sought. An empirical meta-analysis of 127 studies of triangulation applications by Homburg et al. (2012) indicates that the higher in the hierarchy the informant is, and the longer their tenure with the company, the higher the reliability, and in that sense the value, of their responses. The criteria for identifying key informants was decided based on the nature of the finings as described in section 5.7.2, and in accordance with Homburg et al. (2012) suggestions, focused on strategic level managers (VPs and Senior Directors) with at least 2 years at the company.

3.6. Ethical Considerations

Social sciences research is unique in that the data is produced through interaction with the participants, and the knowledge is created as a result of that interaction (Patton, 2002; Ritchie et al. 2014). This knowledge may depend on the cultural context, the researcher's skills, the researcher's agenda, and the participant's agenda (Ritchie et al. 2014). Ethical conduct is critical in social research to ensure participants well-being, through assurances of anonymity, confidentiality, voluntary participation, and statement of research objectives (Ritchie et al. 2014).

Throughout the research, the author has complied with the Heriot-Watt University Code of Conduct. Additionally, the following measures were taken to ensure that participants were aware of their rights, and what was being done to guarantee the confidentiality and privacy of the information they provide.

Prior to the interview, all participants were clearly informed about the nature of this research. At the beginning of the interview, several statements were made to ensure voluntary participation, and to ensure the participants of confidentiality and anonymity. Participants were made aware that they could decline to respond to any particular question or withdraw from the interview altogether without specifying a reason.

Additionally, it was clearly stated that no responses were to be shared with the organisation, although some anonymised quotes may be presented in the final thesis to emphasise certain findings. In no case would the responses be identifiable.

The author is a Sr. Director of Product Management in Company A and has established himself as innovation leader through his role in the various innovation initiatives worldwide. It is not expected that the author's reputation will impact the data collection process thanks to the nature of RGT technique as described in section 3.4.1 above.

3.7. Summary

This study was conducted under the phenomenological paradigm using constructivism as the underlying epistemology, chosen as the most appropriate to explore how middle managers construe the exploratory innovation projects and the approaches used to effectively manage these projects.

Case study method was selected for this study, as it is most suited to answer questions like "*How*" and "*Why*", and is recommended for exploration of complex issues, and situations where variables are not known. A case study researcher can use various techniques and different data sources to validate results from multiple perspectives.

An exploratory study has been conducted with the expectation of finding similarities in construing between middle managers at the same level, and differences in construing between middle managers at different levels. Two case companies that the author has access to have participated in the study. Both companies are multi-national, of a similar size, have similar financial indicators, leaders in their respective industries, exhibit ambidextrous behaviour, and have elements of corporate entrepreneurship. Interview participants have been selected using purposive sampling. These were middle managers from Product Management and Engineering functions, who led both exploitative and exploratory projects in the case companies.

In stage 1 of the main study, the Repertory Grid Technique was used to elicit personal constructs of middle managers on the topic of exploitative and exploratory projects, in terms of what approaches (techniques and metrics), made it for successful outcome of these projects. This technique helps prevent the researcher bias because it is focused on understanding how middle managers think, in their own terms.

Multiple-grid analysis was conducted to analyse the results. First a content analysis was done, where constructs were categorised, and frequency of each category recorded. Then, Honey's technique (see section 3.4) was applied to analyse constructs across the entire sample without sacrificing the idiosyncrasies of the individual grids.

RGT's reliance on a well-documented and rigorous data collection and analysis techniques contributed to the reliability of this study.

A triangulation study was intended to be conducted as stage 2 of the main study, with the goal to confirm and explain the findings generated in stage 1.

The author has complied with the university's guidelines for ethical conduct to ensure the confidentiality and privacy of the case companies and participants, among other considerations.

4. Pilot Study

The previous chapter described the paradigm, method, techniques, and research design aimed at addressing the research questions. This chapter provides an overview of the pilot study that took place prior to the main study to ensure that the research design as described in section 3.5 is viable, and to identify possible lines of investigation, pertaining to differences between the two groups (strategic and tactical).

4.1. Aim and Objectives

A pilot study helps a researcher to refine their 'case study protocol' (see Eisenhardt, 1989a), inform the main study design, gain an early insight into data to be collected, and practice techniques for data collection and analysis (Yin, 2017).

The aim of this pilot study was to test the overall procedure and the applicability of RGT in answering the research questions. Several objectives were set to achieve this aim:

- to test access to managers in Company B, where the author relied heavily on introductions.
- to practice the use of video conferencing software with screen sharing (Go To Meeting) for remote administration of Repertory Grid.
- to estimate the average number of projects that interviewees were ready to produce as elements, and the number of exploratory projects they could come up with. This would indicate the 'range of convenience' of their constructs as noted in section 3.4.1.
- to estimate the average number of constructs that could be elicited in a one-hour interview. This was used as a basis for estimating the target sample size to reach construct saturation (see section 3.6.2).
- to gain an early insight into constructs elicited and evaluate the qualifying phrase (see section 3.4.1.2) for eliciting the relevant constructs.
- to gain early insight into constructs elicited from managers from different levels.
- to practice the content analysis, and to assess the implications for triangulation in stage 2 of the main study;

4.2. Design

To meet the objectives described above, four participants were selected: two from Company A and two from Company B. In both companies the author approached two individuals that matched the profile described in section 3.6.2. Two managers were from the 'tactical group', and two more from the 'strategic group'.

Ahead of the interview, managers were contacted over e-mail, which included an informed consent, and a request to come up with a list of at least 6 projects both exploratory and exploitative.

4.3. Procedure

Data collection for all interviews followed the protocol described in section 3.4.1 to resemble the upcoming main study as much as possible. Interviewees were told that their participation will help to lay the ground for the main study, and they will be asked to provide feedback at the end of the interview on both the overall procedure and the extent to which the meanings reflect how they feel about the topic at hand.

The individual grids were analysed with Rep Plus software (Shaw & Gaines, 2018) to uncover %Similarity scores between the elements, and %Similarity scores between the constructs. Rep Plus is a modelling tool that has been developed over several decades by multiple academic institutions and made available by Shaw and Gaines on servers located in several universities worldwide.

A content analysis was performed across all four grids manually in accordance with the technique described in section 3.4.1.3. Given the small number of constructs inherent in this pilot study design, no reliability check was done, and the results of analysis performed were treated as indicative only.

4.4. Findings

4.4.1. Procedure

Overall, all four participants provided a positive feedback about the process – steps leading to it and the interview itself. This is despite the fact that none of the participants have

encountered the RGT technique before, and that it took one-two rounds of triadic elicitation for them to get used to the technique. Several minor procedural adjustments were made to make it for a smoother administration during the main study, as described in section 4.5.1.

Company B came through on their promise to the author prior to the start of the supervised stage and made introductions to interviewees matching the requested profile.

Remote administration was tested with one of the interviewees using the GoToMeeting software. Constructs elicited using this approach were deemed specific enough, as can be seen by comparing Appendix 1a and 1b.

4.4.2. Elements

Ahead of the interview the participants were asked to provide a list of projects: three-four exploitative and three-four exploratory. In all cases the participants struggled to come up with more than a total of six projects, but all were able to generate a list of three exploratory projects (referred to as 'Project A', 'Project B' and 'Project C') and three exploitative projects (referred to as 'Project D', 'Project E' and 'Project F'). It should be noted that, while all were particular projects from each interviewee's own prior experiences, they were not necessarily the same actual project for each interviewee.

The notion of the 'ideal exploitative' and 'ideal exploratory' projects was well received, and all participants were able to rate them alongside the projects from their own list. Using the ideal projects in the triadic elicitation (see section 3.4.1.2) was not as intuitive for participants, but participants who were asked to use the 'ideal project' in a triad were able to complete the task of naming a construct.

With these finding in mind the implication to the main study is for each grid to consist of eight elements: three exploratory projects, three exploitative projects, one ideal exploratory project and one ideal exploitative project.

4.4.3. Constructs

A total of 46 constructs was generated in these four interviews, not including the supplied construct. On average, participants were able to generate 11 constructs in about 50 minutes,

considering a start-up time and a wrap-up time of about five minutes each in a one-hour interview. Two examples of a grid elicited in this study are shown in Appendix 1a and 1b.

Each grid was typed into MS Excel and processed with Rep Plus software package to indicate similarities among elements and similarities between constructs. The grids (originals and processed) were returned back to the participants, with indication of insights identified by the author. Participants were asked to review the grids and the results for accuracy.

4.4.3.1. Content Analysis

All constructs were coded to 10 categories according to the process described in section 3.4.1.3. Results are presented in Tables 11 through 13, while the detailed constructs are listed in Appendix 2.

Table 11. Pilot Study Content Coding – All Constructs

Category	Description	f	%
Lean Startup Approaches	Techniques typically used by teams to build products that address customer needs	9	19.6
Agile Approaches	Techniques typically used by teams to make software delivery more predictable	8	17.4
Operational Focus	Topics focused on day-to-day tactical team and task management	7	15.2
Tracking Success	Having metrics in place to track the progress of a project and measure its outcomes	6	13.0
Resourcing	Whether resources on projects are dedicated or shared	4	8.7
Executive Sponsorship	Executive commitment and support for a project	3	6.5
Collaboration	Collaboration among stakeholders and across teams	3	6.5
Team Location	Distributed vs. co-located teams and stakeholders	2	4.4
Project Uncertainty	How clear is what needs to be built and how it needs to be achieved	2	4.4
Team Structure	Team formation, composition and size	2	4.4
Total		**46**	**100**

Table 11 shows the general awareness of the importance of Lean and Agile approaches to product development (one third of the constructs are in those two categories), and relatively low awareness of importance of issues such as execute sponsorship and project uncertainty.

Table 12. Pilot Study Content Coding – Strategic Level Only

Category	Description	f	%
Lean Startup Approaches	Techniques typically used by teams to build products that address customer needs	7	30.4
Agile Approaches	Techniques typically used by teams to make software delivery more predictable	5	21.7
Tracking Success	Having metrics in place to track the progress of a project and measure its outcomes	3	13.0
Executive Sponsorship	Executive commitment and support for a project	3	13.0
Resourcing	Whether resources on projects are dedicated or shared	1	4.4
Collaboration	Collaboration among stakeholders and across teams	1	4.4
Team Location	Distributed vs. co-located teams and stakeholders	1	4.4
Project Uncertainty	How clear is what needs to be built and how it needs to be achieved	1	4.4
Team Structure	Team formation, composition and size	1	4.4
Operational Focus	Topics focused on day-to-day tactical team and task management	0	0
Total		**23**	**100**

Table 12 shows recognition of the strategic group that Lean and Agile approaches are critical to project success (over half the constricts are in these two categories). This group recognized the importance of tracking success but did not see managing uncertainty as an important issue. As expected, this group did not give much weight to the operation aspects of product development.

Table 13. Pilot Study Content Coding – Tactical Level Only

Category	Description	f	%
Operational Focus	Topics focused on day-to-day tactical team and task management	7	30.4
Agile Approaches	Techniques typically used by teams to make software delivery more predictable	3	13.0
Tracking Success	Having metrics in place to track the progress of a project and measure its outcomes	3	13.0
Resourcing	Whether resources on projects are dedicated or shared	3	13.0
Collaboration	Collaboration among stakeholders and across teams	2	8.7
Lean Startup Approaches	Techniques typically used by teams to build products that address customer needs	2	8.7
Team Location	Distributed vs. co-located teams and stakeholders	1	4.4
Project Uncertainty	How clear is what needs to be built and how it needs to be achieved	1	4.4
Team Structure	Team formation, composition and size	1	4.4
Executive Sponsorship	Executive commitment and support for a project	0	0
Total		**23**	**100**

Table 13 shows heavy emphasis of the tactical group on operational focus and Agile approaches (almost half the constructs are categorised here), while low emphasis is seen on topics such as Project Uncertainty and no mention of Executive Sponsorship.

4.4.3.2. Implications from the Pilot Data

While four respondents are an insufficient number from which to draw conclusions, this set of interviews has hinted at a possibility of difference in type of constructs received from managers in different level groups. As Table 12 shows, managers in the strategic group tended to give higher importance to Lean and Agile approaches than managers in the tactical group. As Table 13 shows, the tactical group did not recognise the importance of executive sponsorship, while the strategic group didn't recognise the importance of operational focus.

Also, the tactical group did not give as high importance to the Lean Startup approaches as did the strategic group. The importance of tracking a project success – having metrics in place – was equally recognized by both management groups – strategic and tactical. Both groups gave low attention to the project uncertainty, which may indicate the inability to recognize the highly uncertain environment managers find themselves in the context of exploratory projects. In turn this may lead to suboptimal choices of techniques and metrics for these projects.

4.5. Conclusions and Implications for the Main Study

Overall, the pilot study has succeeded in achieving its aim and objectives. It has informed the main study design, with the key decisions listed below.

4.5.1. Procedural Outcomes

1. **Grid administration**. Following adjustments were made to make it for a smoother administration in the main study:
    a. In the beginning of the interview the researcher is to explain the notion of constructs, giving several examples to the participant. This will help set the expectation early on about the kind of data to be expected from the interview.
    b. Set an expectation with the participant that the first few elicitations may feel unfamiliar, and that typically after 2-3 triadic elicitations the interview will flow much smoother. This will help put the participant at ease and avoid stress early in the interview process.
2. **Remote Administration**. Since the constructs elicited in a GoToMeeting session were detailed enough (similar to the level of detail elicited during an in-person interview) and both the author and interviewee did not run into any difficulties, it was decided to use this approach as a viable option in situations where travel for a face-to-face interview was not possible.
3. **Elements**. It was decided to ask each participant to provide six elements: three exploratory and three exploitative. Two 'ideal' elements (exploratory and exploitative) were added to the list, resulting in a total of eight elements.

4. **Sample size**. With 11 constructs per person and the estimated target of about 300 constructs to achieve saturation, it was expected that the target sample will consist of 30 participants across both companies, equally divided between the Strategic and Tactical groups.

5. **Groupings**. Since the division into these two sub-groups has proven useful, it was decided to proceed with additional sub-groups mentioned in section 2.6.2: Product Management vs. Engineering, and Company A vs. Company B. Additionally, a dimension of experience became of interest to the author during the pilot study data analysis, and it was decided to compare construing between the two sub-groups: "More experience with exploratory innovation projects" vs. "More experience with exploitative innovation projects". In the beginning of an interview, the respondents would have been asked to choose which group they belong to.

6. **Implications for the second stage of main study**. As indicated by the preliminary analysis of the pilot study data, the researcher expects to find differences in how managers from different groups (strategic and tactical) think about exploratory projects in stage one of the study (e.g with respect to topics like executive sponsorship and Lean/Agile approaches). Stage two of the study will seek confirmation and explanation of these differences using the triangulation technique described in section 3.4.2.

4.5.2. Belief Statement for Further Exploration

As became evident from the literature synthesis (see section 2.6), the choice of exploration-appropriate approaches and alignment on goals and outcome-based metrics is critical for exploratory project success. That alignment is hard to achieve in part due to the principal-agent problem (see sections 2.3.4.3 and 2.3.4.4), and because managers at different levels have different perspectives on the business environment and project success.

As suggested by the literature synthesis, the pilot study has hinted that managers in the tactical group give importance to different issues than managers in the strategic group (see section 4.4.3.1). For example, managers from the tactical group may not recognize the value of executive commitment to the success of an exploratory project or may not give as high importance to the Lean Startup approaches.

Therefore, it is sensible to formulate the following tentative belief statement:

"***Managers at the strategic level construe exploratory innovation projects differently from managers at the tactical level***".

As a software product management practitioner, the author has observed that managers at tactical levels may give importance to a different set of outcomes than managers at the strategic level and may expect different approaches to be applied to these projects.

The research question and the objectives laid out in section 2.6.2 are positioned to investigate this belief further.

5. Main Study

5.1. Introduction

This chapter describes findings from stage one and stage two of the main study following the methods and techniques presented and discussed in chapter 3. It is organized in a way that helps test the belief statement offered in section 4.5.2 and answer the main and supporting research questions presented in section 2.6.2.

First, the sample overview is given, and the various groups of respondents are discussed. Then, the analysis of the data collected in the first stage of the main study is presented in the following sequence:

1. Constructs are analysed to answer the main research question and test the belief statement.
2. Elements are analysed to answer the supporting question.

The second stage of the main study follows with Key Informant Interviews as the technique used for triangulation. The chapter concludes with the synthesis of findings and analysis from both stages of the main study.

5.2. Sample and Groups

The data was collected from both companies (Company A and Company B) following the procedure described in chapter 3. Since the main research question focused on the difference in construing between the strategic and tactical levels in an organization, an attempt was made to interview similar number of managers from each of these levels. Additionally, as described in section 3.5.2, a comparison of construing between managers from Product Management and Engineering functions was of interest, and so an attempt was made to interview a similar number of managers from each of these functions. While Company B was included in this research mainly to provide a sufficient number of constructs (see section 3.5.1 and compatible studies by Pankratz & Basten (2014) and Rojon et al. (2019)), inevitably, with two case companies participating in this research the question of comparison in construing between managers of these two companies would become of interest, and so an attempt was made to interview similar number of managers in each company. As described in section 3.5.2, the overarching criterion for selection was the participants' prior experience

with leading at least six projects of both types: three exploratory and three exploitative. This has limited the number of possible respondents from each company, yet as can be seen from the Table 14 below, the author was able to come close to the objective of interviewing a similar number of participants from each of the various groups.

Table 14 compares the number of participants in each group between the case companies, and Appendix 3 provides an additional level of detail, listing the makeup of each group as well as the number of constructs elicited from each group and sub-group.

Table 14. Summary sampling structure by company and group

		Company A	Company B	% of All Respondents
Group	**Total Participants**	**13** **52.0%**	**12** **48.0%**	**25** **100%**
Organizational Level	**Strategic**	7 58.3%	5 41.7%	12 48%
	Tactical	6 46.2%	7 53.8%	13 52%
Function	**Product Management**	7 58.3%	5 41.7%	12 48%
	Engineering	6 46.2%	7 53.8%	13 52%
Experienced more with	**Exploratory projects**	7 43.8%	9 56.2%	16 64%
	Exploitative projects	6 66.7%	3 33.3%	9 36%
Data Collection Approach	**In Person**	11 78.6%	3 21.4%	14 56%
	Remote	2 18.2%	9 81.8%	11 44%

While the author was able to interview a similar number of respondents from each company (52% from Company A, 48% from Company B), the author faced a significant difficulty recruiting strategic level managers in Company B (41.7% of strategic respondents came from

Company B, 58.3% - from Company A). This is mainly due to the fact that the author was not known to participants from Company B and therefore it was harder to get senior level managers to commit their time. Additionally, only one VP-level manager from company B participated in the research, as compared to five VP-level managers from Company A. Overall, the strategic level respondents accounted for 48% of all respondents and the tactical level respondents for 52%.

Respondents from the Product Management function accounted for 48% of all respondents, and Engineering for 52%. The author faced some challenges recruiting managers from the Product Management function in Company B, which resulted in 58.3% of Product Management managers from Company A, and 41.7% from Company B.

As described in section 4.5.1, the remote administration of the RGT was deemed successful during the pilot study, and it was extensively utilized during the main study.

Table 15. Data Collection Approach Details

Approach		Number of Constructs	Interview Length (min)
In Person	Total	179	670
	Average	12.8	47.9
Remote	Total	128	525
	Average	11.6	47.7
Overall	Total	307	1195
	Average	12.28	47.8

While in Company A the author had more opportunity to interview in-person, the majority of participants from Company B were interviewed remotely. No difficulties were encountered in the remote sessions. As illustrated in Table 15 above, these resulted in an average of 11.6 constructs elicited per person. As a comparison, on average, in-person interviews resulted in 12.8 constructs elicited per person. The average time spent in a remote session was 47.7 minutes as compared to 47.9 minute in-person session.

5.3. Construct Analysis

5.3.1. Content Analysis Procedure

A total of 307 constructs was collected from 25 respondents in both companies. As discussed in section 3.5.2 the goal was to reach approximately 300 constructs. A content analysis was performed in accordance with the procedure outlined in section 3.4.1.3. Figure 10 below shows the process of coding that is described in this section.

Figure 10. Content Coding Workshop

Appendix 4 provides details of all constructs verbatim. Each construct is accompanied by two scores: the %Similarity score and H-I-L index. As described in section 3.4.1.3, these values preserve the idiosyncrasies of individual responses as the constructs are presented in the context of the entire sample.

5.3.2. First Attempt at Categorization

The researcher categorized the 307 collected constructs into 24 distinct categories (see Table 16 below). A colleague who has been trained in the coding procedure in advance by the researcher was asked to assist for the purposes of reliability check. The colleague's coding resulted in 28 categories.

Table 16. Content Coding – First Attempt

Researcher			Colleague		
Category	**f**	**%**	**Category**	**f**	**%**
Funding	5	1.6	Well Resourced	6	2.0
Partner & Community Involvement	6	2.0	Partner Engagement	7	2.3
Organisational Alignment	12	3.9	Strategic Alignment	6	2.0
Executive Sponsorship	9	2.9	Executive Support	9	2.9
Leadership	9	2.9	Project Leader / Hero Reliance	6	2.0
Clarity of Vision	25	8.1	Clear Vision and Goals	21	6.8
Methodologies	20	6.5	Agile / Waterfall	27	8.8
Data Driven Decision Making	12	3.9	Data Visibility	9	2.9
Clarity of Objectives and Outcomes	24	7.8	Clear Success Metrics	16	5.2
Customer Feedback	10	3.3	Customer Engagement / Empathy	17	5.5
Motivation & Incentives	9	2.9	Team motivation and incentives	6	2.0
Market Orientation	9	2.9	Established Market Alignment	16	5.2
Dependency Management	11	3.6	Dependencies	21	6.8
Technology	10	3.3	Technology Considerations	18	5.8
Risk Reduction	9	2.9	Risk Avoidance	11	3.6
Metrics	20	6.5	Revenue Based Metrics	10	3.3
Team Skills & Structure	32	10.4	Team Structure & Organization	22	7.2
Scope Management	3	1.0			
User Experience Focus	6	2.0			
New Market Orientation	9	2.9			
Delivery Cadence	12	3.9			
Software Development Practices	11	3.6			
Requirements Source	20	6.5			
Misc	14	4.6			
			Team Size	9	2.9
			Co-Located Resources	6	2.0
			Ability to Execute	8	2.6
			Market Understanding and Expertise	15	4.9
			Hard Deadlines	5	1.6
			Scope	4	1.3
			Validation Methods	5	1.6
			Autonomy vs. Micromanagement	8	2.6
			Stakeholder Considerations	5	1.6
			Business Case / Model Considerations	6	2.0
			Misc	8	2.6
Total	**307**	**100**		**307**	**100**

Appendix 5 shows the results of reliability analysis for this round.

As can be seen here, this resulted in %Agreement of 46.2% on constructs in the agreed upon 17 categories, which is an unacceptably low degree of agreement. The reliability was reduced further by the fact that only 236 constructs out of 307 were captured by the agreed upon categories. As a result, a negotiation on category meaning and another coding attempt was required.

5.3.3. Intermediate Categorization

Before the second attempt at coding, the researcher and colleague compared the categories, and discussed their meanings As a result, new categories were created, and category meanings were agreed upon. At the end of the second coding round, the researcher coded all constructs into 31 categories, and the colleague into 30, as shown in Table 17 below.

Table 17. Intermediate Categories

Researcher			Colleague		
Category	**f**	**%**	**Category**	**f**	**%**
Funding	5	1.6	Well Resourced	5	1.6
Partner & Community Involvement	6	2.0	Partner Engagement	6	2.0
Customer Engagement	19	6.2	Customer Engagement / Empathy	17	5.5
Organisational Alignment	6	2.0	Strategic Alignment	6	2.0
Stakeholder Considerations	9	2.9	Stakeholder Considerations	9	2.9
Executive Sponsorship	8	2.6	Executive Support	7	2.3
Leadership	9	2.9	Project Leader / Hero Reliance	6	2.0
Clarity of Vision	14	4.6	Clear Vision	13	4.2
Clarity of Objectives and Outcomes	17	5.5	Outcomes and Goals	17	5.5
Agile / Waterfall	30	9.8	Agile / Waterfall	30	9.4
Data Driven Decision Making	10	3.3	Data Visibility	9	2.9
Market Alignment	16	5.2	Established Market Alignment	14	4.6
Motivation & Incentives	8	2.6	Team motivation and incentives	7	2.3
Team Organization	22	7.2	Team Structure & Organization	28	7.2
Team Size	8	2.6	Team Size	9	2.6
Co-Location	6	2.0	Co-Located Resources	6	2.0
Ability to execute	8	2.6	Ability to execute	9	2.6
Dependency Management	10	3.3	Dependencies	14	3.3
Technology Considerations	11	3.6	Technology Considerations	11	3.6
Software Development Practices	10	3.3	Software Development Practices	6	2.0
Risk Reduction	10	3.3	Risk Avoidance	11	3.3
User Experience Design Team Involvement	3	1.0	Design Team Involvement	3	1.0
Market Understanding & Expertise	14	4.6	Market Understanding & Expertise	14	4.6
Validation Methods	5	1.6	Validation Methods	5	1.6
Empowerment	5	1.6	Autonomy vs. Micro-Management	8	1.6
Schedule Considerations	5	1.6	Hard Deadlines	5	1.6
Metrics focused on Revenue	8	2.6	Revenue Based Metrics	9	2.6
Clarity of Metrics	9	2.9	Clear Success Metrics	9	2.3
Business Case / Model Considerations	7	2.3	Business Case / Model Considerations	8	2.3
Scope Management	5	1.6	Misc	6	1.0
Misc	4	1.3			
Total	**307**	**100**		**307**	**100**

Appendix 6 shows the results of reliability analysis for this round.

This attempt resulted in %Agreement of 93.7%. While this is a respectable level of agreement, upon closer review of the resulting categories several opportunities for combining categories were identified as described in the next section.

5.3.4. Definitive Categorization

According to Miles et al. (2019), 'Second Cycle' coding is a technique used to identify patterns in a list of categories from the 'First Cycle' coding (see section 3.4.1.3) and combine them into a smaller list of categories with bigger picture meanings. The researcher's and colleague's view as practitioners was used to make the final decision on which categories are to be combined, and what broader meaning the combined categories have. This resulted in a total of 15 categories as presented in Table 18 below.

Two examples below demonstrate the reasoning used in combining the categories.

Example 1 – Combining 'Risk Management' with 'Agile/Waterfall' under the 'Methodologies' category

One of the main premises of Agile methodology (see Glossary) is raising visibility of project risk, and then actively reducing that risk through early experimentation, implementing an engineering proof of concept, or performing a time-boxed research activity. The following are examples of constructs under the 'Risk Management' category that exemplify this point:

Risks were visible and transparent	Risks were not visible
Involved prototyping (POC) to reduce feasibility risk	Prototyping was not required as risk was low
Agile spikes were needed to reduce uncertainty	Spikes were not needed as there was less uncertainty
Significant number of interviews to address major unknowns	Small number of interviews to validate some assumptions with some unknowns
Heavy experimentation & technology investigation	Less experimentation due to higher certainty

Example 2 – Combining 'Market Understanding and Expertise' with 'Market Alignment' under the 'Market Focus' category

To successfully deliver a product to market, a company needs to understand that market in terms of its needs (what problems need to be solved, who are competitors in this market, how do customers solve the problem today, etc). That understanding is also required to develop an effective 'go to market' plan, and enable the sales force and partners, so they become effective at selling, deploying, and maintaining the product. Following are examples of constructs under both categories:

Aligned with existing routes to market	No alignment with existing routes to market
Focused on new personas	Focused on personas we knew well
Follow existing Go To Market motion	Changing the Go To Market Approach
Had a big legacy market to deal with	Started fresh with a new customer base
A clear vision about what market we are going after	Less clarity about target market
The target user was well known	The context for the product use was less known
Thorough market analysis was done	No market analysis
Solution that addresses a market need	Solution has no target market, done for the sake of being done

The constructs in this final list of categories were reviewed to ensure that the broader meaning of each resulting category made sense for these constructs. Appendix 8 provides more detail on constructs included in each resulting (and henceforth – **definitive**) category. Column **f** indicates the overall frequency of constructs in a category, **f(H)** indicates the frequency of 'high importance' constructs (those with H-I-L index of **H**), **f(H)%** indicates the percentage of high importance constructs in that category (as described in section 3.4.1.3, the H-I-L index indicates whether the %Similarity score is placed high (H), intermediate (I), or low (L) for that particular individual).

Table 18. Definitive Categories

Category	Intermediate Categories	Includes	f	f(H)	f(H)%
Methodologies	Agile / Waterfall, Risk Reduction, Software Development Practices, Scope Management	Considerations about the software development methodology used for project execution (Agile vs. Waterfall), cadence of releases, response to change, risk reduction methods, and modern software development practices	55 17.9%	25 8.1%	45.5
Team Organization	Team Organization, Team Size, Co-Location, Dependency Management, User Experience, Design Team Involvement	Considerations about the team structure and organization around a project, team size, co-location, and dependencies on other teams	49 16.0%	15 4.9%	30.6
Customer Focus	Customer Engagement, Partner and Community Involvement, Validation Methods, Business Case / Model Considerations	Factors involved in understanding the customer behaviour, engaging with customers and partners, and whether these interactions drove the product direction	37 12.1%	7 2.3%	18.9
Market Focus	Market Alignment, Market Understanding and Expertise	The extent to which the leadership team of the project understands the market the product is being developed for; how well is the project aligned with the market needs, and with the go-to-market motion	30 9.8%	9 2.9%	30
Metrics	Clarity of Metrics, Metrics focused on Revenue	Presence of metrics, ability to track success, revenue specific metrics	17 5.5%	5 1.6%	29.4
Clarity of Objectives and Outcomes	Clarity of Objectives and Outcomes	Importance of having clear objectives and outcomes for the project	17 5.5%	9 2.9%	52.9
Organisational Alignment	Organizational Alignment, Stakeholder Considerations	The extent to which the product in development is aligned with the rest of the organization and its strategy, had alignment and buy-in from external and internal stakeholders	15 4.9%	10 3.3%	66.7

Clarity of Vision	Clarity of Vision	How clear is the overall vision and strategic direction	14 4.6%	7 2.3%	50
Motivation and Empowerment	Motivation and Incentives, Empowerment	The extent to which the teams were motivated, incentivized, and empowered to make decisions and execute on the project	13 4.2%	5 1.6%	38.5
Technology Considerations	Technology Considerations	Considerations about the technology and architecture of the product being developed	11 3.6%	2 .7%	18.2
Data Driven Decision Making	Data Driven Decision Making	Ability to track product health and usage and make decisions based on that data	10 3.3%	5 1.6%	50
Project Constraints	Funding, Schedule Considerations	The extent to which the project had budget available and deadlines imposed.	10 3.3%	3 1.%	30
Strong Leadership	Strong Leadership	Importance of having strong leadership on the project. It may come from above or from within the team. Can be business or technical.	9 2.9%	6 2.%	66.7
Ability to Execute	Ability to Execute	How well is the team positioned to execute on the project, with respect to the skills, resources, maturity.	8 2.6%	5 1.6%	62.5
Executive Sponsorship	Executive Sponsorship	Importance of having an executive sponsor on the project	8 2.6%	2 .7%	25
Misc	Misc		4 1.3%	1 .3%	25
Total			**307 100%**	**116 37.8%**	**37.8**

Appendix 7 shows the results of reliability analysis for this round.

This attempt resulted in %Agreement of 92.5%. As described in section 3.4.1.3, for more robust measure of reliability, two additional indices are typically used to assess the reliability of agreement between the researchers, as they account for chance agreement between the researchers. In this final codding attempt, these indices were as follows: Cohen's Kappa of 0.92, and Perreault-Leigh Ir Index of 0.96.

Landis & Koch (1977) were the first to suggest a benchmark based on Cohen's Kappa. According to them, an agreement of 0.61 to 0.8 is considered 'substantial', and an agreement above 0.81 is considered 'almost perfect' (Landis & Koch, 1977, p. 165). According to Jankowicz (2004), the benchmarks to aim for are %Agreement of 90%, Cohen's Kappa or Perreault-Leigh Index of at least 80%, with a common target of 0.90 for a typical Repertory Grid analysis for these two indices. And so, the resulting agreement of this round was deemed acceptably reliable, and hence sufficient to complete the analysis.

5.4. Construct Analysis Results

5.4.1. Category Analysis

The following is the summary of the categories, their description and characteristics. Each category description mentions the percentage of high importance constructs in the overall number of constructs in that category. The intent is to show the proportion of all constructs that interviewees found more closely aligned (and therefore more important to achieving the project success) with the 'summary construct' (see section 3.4.1.2) supplied at the beginning of the interview.

Methodologies

The 'Methodologies' category includes considerations about the software development methodology used for project execution. Constructs in this category may refer to methodologies such as Agile, Lean, or Waterfall (see Glossary) directly, or they may imply a use of one of these methodologies by referencing cadence of releases, the way the team responded to change, what risk reduction methods were employed, or type of software development practices used. This category has the highest frequency of constructs (overall and high importance constructs), with high importance constructs contributing to 45.5% of the total constructs (see the right-most column in Table 18). Below are examples of high importance constructs (see section 3.4.1.3) from this category:

Agile methodology used for development	More traditional / waterfall methodology
Multi-staged overengineered discovery	Lean, prototype-driven discovery
Get to a shippable increment/MVP as soon as possible to have people experience the product	Wait too long to ship
Had a clear understanding of risk	Risks were not clearly identified
Requirements scope has changed often	Minor alterations to scope
Good ‘definition of done’	No good ‘definition of done’

Quotes below were captured during the Repertory Grid interviews, and are relevant to constructs in the Methodology category:

“*Agile is not suited for charting new territories*" (respondent ASEX-7).

“*By adding Sales, Marketing, and Support to the daily SCRUM, customer stories were shared constantly, developers became more engaged and customer focused"* (respondent ATPI-11).

Constructs in this category that relate to risk management, are closely aligned with Agile practices, as mentioned above. While there are only 10 constructs related to risk reduction, these come from 9 different individuals – more than a third of the sample.

Team Organization

This is the second highest frequency category, with high importance constructs contributing to 30.6% of the constructs. This category includes considerations about the team structure and organization around a project. It includes topics such as team size, co-location, shared vs. dedicated resources, involvement and engagement of different functions such as Product Management and UX Design, and dependencies on other teams. Below are examples of high importance constructs from this category:

Well defined responsibilities for each member of the team	Responsibilities loosely defined or undefined
Project coordination was more complex	Project coordination was less complex
Clarity of roles and responsibilities	Lack of clarity of roles and responsibilities
High degree of focus, small co-located team	Globally distributed team, personnel issues, communications overhead
Product managers not co-located with Engineering	Product managers co-located with engineering

Customer Focus

The ‘Customer Focus’ category includes factors involved in understanding customer behaviour, engaging with customers and partners, and whether these interactions drove the product direction as opposed to the internally driven projects based on the product leadership team’s vision. High importance constructs contribute to 18.9% of the constructs. Below are examples of high importance constructs from this category:

Customer partnership and commitment from day 0 (customer got stock)	Solution developed in-house then looked for a market
Requirements driven by customer validation	Requirements are not driven by customer validation
Customer-driven input early in the project	Customer input/validation before shipping
In person customer discovery	Aggregate customer data

The quote below was captured during the Repertory Grid interviews, and is relevant to constructs in the Customer Focus category:

"*Important to have community engagement (in the context of Open Source software) as it leads to traction and feedback and helps develop at scale through community contributions*" (respondent BSEX-1).

It is surprising to see that only four respondents mentioned validation approaches focused on getting fast customer feedback. This will be discussed further in Chapter 6.

Market Focus

This category includes considerations related to the extent to which the leadership team of a project understands the market the product is being developed for and how well the project is aligned with the market needs, and with the go-to-market motion. High importance constructs contribute to 30% of the constructs. Below are examples of high importance constructs from this category:

Aligned with existing routes to market	No alignment with existing routes to market
Had a good go to market plan and execution	Poor go to market plan and execution
Solving high impact and high urgency (time to market) problems for the business	The problem was not as urgent or as impactful
Had a good understanding of the target market	Did not have a good understanding of target market

Metrics

This category focuses on presence of metrics of various kind and the ability to track success. High importance constructs contribute to 29.4% of the constructs. Below are examples of high importance constructs from this category:

High focus on revenue and sales	Low focus on revenue or sales
More rigorous in defining and tracking KPIs	Less rigorous in defining and tracking KPIs
Success measured as an impact on the target market	No significant impact on target market
Had team efficiency/productivity metrics in place	Team productivity was not measured

Quote below was captured during the Repertory Grid interviews, and is relevant to constructs in the Metrics category:

"*For exploratory projects the value of the financial KPIs is higher than for exploratory projects, because the ROI needs to be clearly shown to justify the investment*" (respondent ASPX-2).

With only 17 constructs in this category, these came from a total of 13 respondents – just over 50% of all respondents.

The most surprising finding as it relates to this category, is the fact that only 3 out of 17 constructs mention non-revenue-based metrics - metrics focused on traction/usage. This will be discussed further in Chapter 6.

Clarity of Objectives and Outcomes

This category includes considerations related to the importance of having clear objectives and outcomes for the project. Unlike the 'Clarity of Vision' category, here the focus is on project outcomes rather than the strategic vision. High importance constructs contribute to 52.9% of the constructs. Below are examples of high importance constructs from this category:

Had clear objectives and clear leadership	Lack of solid objectives and good leadership
Success criteria was known to all	Success criteria was not clear
Starting out with well-defined milestones	Starting out with no or ill-defined milestones
Had several intended outcomes	Had one specific outcome

Organizational alignment

While this category is seventh in terms of the construct frequency (15 constructs, 4.9% of all constructs) it has the highest percentage of high importance constructs (66.7%), indicating that the issue of organizational alignment is very important (to those specific interviewees who mention it) to achieve a successful project outcome. This category includes considerations about the extent to which the product in development is aligned with the rest of the organization and its strategy, as well as the extent to which there was an alignment and buy-in from external and internal stakeholders. Below are examples of high importance constructs from this category:

Strategic alignment led to success	Strategic misalignment led to failure of a project
Alignment with strategic goals	No alignment with strategic goals
Alignment across various functions in the company	Siloed functions, no alignment across company
Diverse set of stakeholders aligned and partnered to achieve goals	Stakeholders were not aligned on mutual goals

Quote below was captured during the Repertory Grid interviews, and is relevant to constructs in this category:

"*I observed this a lot in my career: you have a cool idea, but the company is not behind it. Working on something nobody cares about*" (respondent BSEX-1).

"*I was able to kill projects that didn't align with the strategy*" (respondent ATPI-3).

Clarity of Vision

This category focuses on clarity of the overall vision, mission, and strategic direction. High importance constructs contribute to 52.9% of the constructs in this category. Below are examples of high importance constructs from this category:

Had a shared vision of what we are trying to accomplish	Did not have a shared vision
Vision, requirements, target audience were clear	Vision, requirements, target audience were NOT clear
Had clear business problems to be solved	Open scope, no boundaries, business problem too broad
Clearly communicated mission	Unclear mission

Motivation and Empowerment

This category focuses on the extent to which the teams were motivated, incentivized, and empowered to make decisions and execute on the project. High importance constructs contribute to 38.5% of the constructs in this category. Below are examples of high importance constructs from this category:

Team motivated to drive project to successful outcome	Unmotivated, burnt-out team members
Right compensation and incentives for the team	Underpaid, no rewards for success
Sales teams were incentivised to sell	Sales teams were not incentivised to sell
Lowest level engineers knew the short-term goals and were empowered to make decisions	Engineers were not able to make decisions due to lack of empowerment or knowledge

Technology Considerations

This category includes considerations about the technology and architecture of the product being developed. High importance constructs contribute to 18.2% of the constructs in this category. Below are examples of high importance constructs from this category:

Solved only one technical problem	Needed to solve a myriad of technical problems
Fully expected to build entirely in house	Fully expected to buy technology or product

Data Driven Decision Making

This category includes constructs concerning the ability to track product health and usage and make decisions based on that data. High importance constructs contribute to 50% of the constructs in this category. Below are examples of high importance constructs from this category:

No telemetry to measure usage	Good usage telemetry
Full usability into the usage data	No visibility into usage data
Multiple indicators of usage	Few indicators of usage
Development relied on data (telemetry)	No data available to help make decisions

Project Constraints

This category includes considerations about the extent to which the project had budget available and deadlines imposed. High importance constructs contribute to 30% of the constructs in this category. Below are examples of high importance constructs from this category:

Well-funded with resources	Not well funded
Predictable delivery based on past performance	Imposed deadlines
Projects had a realistic deadline	The deadline was not realistic

Strong Leadership

This category focuses on the importance of having strong leadership on the project. It may come from above or from within the team, it can be business or technical. High importance constructs contribute to 66.7% of the constructs in this category, making it the second category with that high proportion. Below are examples of high importance constructs from this category:

Unity of command, one goal, one person in charge of that goal	Diffused command – multiple people, multiple goals
Had a strong champion to drive the project forward, involved in day to day	Did not have a strong champion
Driven by a passionate engineer	PM driven requirements without clear purpose
Had a benevolent dictator at the helm	Had a committee in charge

Ability to Execute

Constructs in this category focus on how well the team is positioned to execute on the project, with respect to the skills, resources, and maturity. High importance constructs contribute to 62.5% of the constructs in this category. Below are examples of high importance constructs from this category:

Teams with a complete skill set (had skill diversity)	Homogenic skills, no diversity
Appropriate resources (right skills, adequate number of resources)	Resources not appropriate for the project
Had ability to execute on the vision	Did not have an ability to execute on the vision

Executive Sponsorship

Constructs in this category focus on the importance of having an executive commitment, at times in the form of a clear sponsor on a project. High importance constructs contribute to 25% of the constructs in this category. Below are examples of high importance constructs from this category:

Had a strong executive commitment	Marginal executive support
Had executive buy in	Did not have executive buy in

5.4.2. Category Analysis Summary

15 categories have been reviewed in depth, with the frequency of constructs in each, and the examples of high importance constructs in each category. The three highest frequency categories are 'Methodologies', with 55 constructs (17.9%), followed by 'Team Organization', with 49 constructs (16.0%), and 'Customer Focus', with 37 constructs (12.1%); between them, these account for almost half, 46%, of all the constructs.

The 'Methodologies' category is not only the one with the highest frequency of constructs (17.9%), but also the one with the highest percentage of high importance constructs (45.5%) among the top 3 categories; in other words, not only is it important in terms of frequency across the sample, but it is important in terms of individual importance (in other words, for those who mentioned it, it really matters).

As mentioned in section 5.4.1 above, several findings were somewhat surprising based on the literature review and the practitioner's expectations. These findings are briefly mentioned here and will be discussed in Chapter 6:

1. Constructs related to risk reduction represent only 3.3% of all constructs but were mentioned by 9 different individuals.
2. While the topic of metrics was mentioned by 13 respondents, there were only 3 constructs that mentioned user traction metrics – these being key to exploratory project measurement.
3. One area seems not to be well represented in the sample of constructs – experimentation, which is key to successful development of exploratory innovation projects. This is related to the fact that only four respondents mentioned validation approaches focused on getting fast customer feedback, and a total of eight constructs

could be somewhat mapped to approaches related to Lean Startup – most appearing under the 'Methodologies' category. This can possibly indicate a low level of familiarity with the Lean Startup approaches or lack of knowledge about how to apply those approaches in practice. These findings will be further explored in key informant interviews (see section 5.7).

5.4.3. Analysis of Sub-Groups

This section will describe the differential analysis (see section 3.4.1.3) of how sub-groups of respondents (see Table 14 for a reminder of the sampling structure) construe certain issues represented by categories of meaning.

There are four groups that will be compared: Company (Company A vs. Company B), Level (Strategic vs. Tactical), Function (Product Management vs. Engineering), and Experience (More experience with Exploratory projects vs. More experience with Exploitative projects). The 'Level' group is of most interest to answer the main research question (see section 2.6.2) and test the associated belief statement (see section 4.5.2).

Each group analysis starts with a table with the relevant differential analysis based on the 15 categories (setting aside the 'Miscellaneous' category). Appendix 10 can be referenced for the additional level of details. Once the analysis is completed based on the 15 categories, an additional insight is sought by looking back at the intermediate categories: categories with statistically significant differences are presented in a table, with the detailed significance values being shown in Appendix 11.

5.4.3.1. Stance Towards Statistical Tests

The analysis will focus on comparing two proportions in a sample, therefore allowing for a two-tailed z-statistic test at 95% level of confidence, unless stated otherwise. It should be noted, that z-test is not used here for hypothesis testing in order to generalize to a population (as would be more appropriate in positivist research), but merely as an indication of where the results are worth noting. Therefore, without wishing to overgeneralize when it comes to issues of statistical significance, in the discussion that follows attention is drawn to categories with the most constructs.

5.4.3.2. The 'Company' Group Analysis

As described in section 3.5.1, there was no intent to design a comparator case study, and the main reason for having two case companies in this study was to collect a sufficient number of constructs. As described in section 5.2 above, the data collection resulted in 13 interviewees from company A with a total of 166 constructs, and 12 interviewees from Company B with a total of 141 constructs.

Table 19. The 'Company' group – differential analysis
(*indicates **z** significant at <0.05 and >0.01 level; ** indicates **z** significant at <= 0.01)

Category	Company						z(n)
	A			B			
	n	H	f(H)	n	H	f(H)	
Methodologies	36 (22%)	18	50%	19 (13%)	7	37%	1.87
Team Organization	23 (14%)	11	48%	26 (18%)	4	15%	-1.09
Customer Focus	24 (14%)	5	21%	13 (9%)	2	15%	1.40
Market Focus	8 (5%)	3	38%	22 (16%)	6	27%	-3.17**
Metrics	13 (8%)	4	31%	4 (3%)	1	25%	1.91
Clarity of Objectives and Outcomes	6 (4%)	3	50%	11 (8%)	6	55%	-1.60
Organisational Alignment	9 (5%)	7	78%	6 (4%)	3	50%	0.47
Clarity of Vision	7 (4%)	4	57%	7 (5%)	3	43%	-0.31
Motivation and Empowerment	6 (4%)	2	33%	7 (5%)	3	43%	-0.59
Technology Considerations	5 (3%)	1	20%	6 (4%)	1	17%	-0.58
Data Driven Decision Making	9 (5%)	4	44%	1 (1%)	1	100%	2.32*
Project Constraints	7 (4%)	3	43%	3 (2%	0	0%	1.03
Strong Leadership	6 (4%)	4	67%	3 (2%)	2	67%	0.77
Ability to Execute	4 (2%)	1	25%	4 (3%)	4	100%	-0.23
Executive Sponsorship	2 (1%)	0	0%	6 (4%)	2	33%	-1.67
Misc	1 (1%)	0	0%	3 (2%)	0	0%	-1.17
Total	**166**	**70**	**42%**	**141**	**45**	**32%**	

As can be observed from Table 19 above, there are several differences in how managers in the two case companies construe what makes for effective management of projects towards a successful outcome. Managers from Company A gave significantly higher importance to issues of 'Data Driven Decision Making' (z=2.32), while managers from Company B gave significantly higher importance to 'Market Focus' (z=-3.17).

The difference in 'Market Focus' can be explained by the fact that the developer community and partnerships play key role in Company B which operates based on the Open Source business model.

Several additional differences can be observed, albeit significant only at 90% level of confidence. Managers from Company A gave higher importance to issues of 'Methodologies' (z=1.87) and 'Metrics' (z=1.91), while managers from Company B gave higher importance to 'Executive Sponsorship' (z=-1.67).

Honey's technique (see section 3.4.1.3) offers additional insight into these findings. As can be seen from this table, the proportion of high importance constructs in some categories differs between the two sub-groups. For instance, when it comes to issues of 'Team Organization', respondents from Company A had more personally important constructs (48%) than respondents from company B (15%). Similarly, respondents from Company A had more personally important constructs (78%) than respondents from company B (50%) on issues of 'Organizational Alignment'.

5.4.3.3. The 'Level' Group Analysis

The Strategic sub-group consists of VPs and Senior Directors, while the Tactical sub-group consists of Managers, Senior Managers, and Directors from both the Product Management and Engineering functions in each case company (see section 3.5.2).The importance of comparing these two groups stems from the principal-agent problem as described in sections 2.3.4.3, 2.3.4.4, and 2.3.5 (i.e. the managers in the Tactical sub-group may not be acting in the best interest of the managers in the Strategic group). This analysis helps answer the main research question (see section 2.6.2).

Table 20. The 'Level' group – differential analysis

(*indicates **z** significant at <0.05 and >0.01 level; ** indicates **z** significant at <= 0.01)

Category	Level						z(n)
	Strategic			Tactical			
	n	H	f(H)	n	H	f(H)	
Methodologies	29 (19%)	14	48%	26 (17%)	11	42%	0.47
Team Organization	25 (16%)	12	48%	24 (16%)	3	13%	0.18
Customer Focus	18 (12%)	3	17%	19 (12%)	4	21%	-0.15
Market Focus	17 (11%)	4	24%	13 (8%)	5	38%	0.79
Metrics	7 (5%)	3	43%	10 (6%)	2	20%	-0.73
Clarity of Objectives and Outcomes	10 (7%)	5	50%	7 (5%)	4	57%	0.76
Organisational Alignment	8 (5%)	5	63%	7 (5%)	5	71%	0.28
Clarity of Vision	8 (5%)	3	38%	6 (4%)	4	67%	0.56
Motivation and Empowerment	5 (3%)	0	0%	8 (5%)	5	63%	-0.84
Technology Considerations	7 (5%)	2	29%	4 (3%)	0	0%	0.93
Data Driven Decision Making	2 (1%)	0	0%	8 (5%)	5	63%	-1.92
Project Constraints	3 (2%)	1	33%	7 (5%)	2	29%	-1.28
Strong Leadership	6 (4%)	4	67%	3 (2%)	2	67%	1.02
Ability to Execute	1 (1%)	1	100%	7 (5%)	4	57%	-2.14*
Executive Sponsorship	5 (3%)	1	20%	3 (2%)	1	33%	0.73
Misc	2 (1%)	0	0%	2 (1%)	0	0%	0.01
Total	**153**	**58**	**38%**	**154**	**57**	**37%**	

At first glance (see Table 19 above), there is no major difference in proportion of constructs between the Tactical and Strategic sub-groups in most categories.

The only category that shows a statistically significant difference between the two sub-groups is 'Ability to Execute', with **z**=-2.14 > $z_{.05}$ =-1.96 in a two-tailed test. This clearly shows that

managers from the Tactical sub-group consider the team's ability to execute on the project a more important issue for project success than managers from the Strategic sub-group. At first glance, this finding makes sense, as the Tactical managers are the ones organizing the teams for project execution. On the other hand, this disparity may lead to agency issues (see sections 2.3.4.3 and 2.3.4.4).

Another category that comes close is 'Data Driven Decision Making', indicating that managers from the Tactical sub-group consider the ability to make decisions based on data more important for project success than managers from the Strategic sub-group. As mentioned in section 5.3.1, this is consistent with the author's observations in Company A. With a **z** value of -1.92, the difference is significant at 90% confidence only, which is not considered a strong test.

Looking at the proportion of high importance constructs, respondents from the 'Strategic' level have more personally important constructs about 'Team Organization' (48%) than respondents from the 'Tactical' level (13%).

These findings will be summarized in section 5.4.4 below and discussed further in Chapter 6.

5.4.3.4. The 'Function' Group Analysis

Focusing on the Product Management and Engineering functions in the company the author sought to extend on the findings of Pankratz and Basten (2014) to shed light on the construing of key decision makers in software companies, as opposed to project managers in IT departments, which was the focus of Pankratz and Basten's research, as described in section 2.4.3.1. This analysis helps address one of the research objectives (see section 2.6.2).

Table 21. The 'Function' group – differential analysis

(*indicates **z** significant at <0.05 and >0.01 level; ** indicates **z** significant at <= 0.01)

Category	Function						z(n)
	Product			Engineering			
	n	H	f(H)	n	H	f(H)	
Methodologies	25 (16%)	12	48%	30 (20%)	13	43%	-1.04
Team Organization	19 (12%)	8	42%	30 (20%)	7	23%	-1.99*
Customer Focus	26 (16%)	4	15%	11 (7%)	3	27%	2.40*
Market Focus	16 (10%)	8	50%	14 (9%)	1	7%	0.18
Metrics	10 (6%)	3	30%	7 (5%)	2	29%	0.60
Clarity of Objectives and Outcomes	10 (6%)	5	50%	7 (5%)	4	57%	0.60
Organisational Alignment	12 (8%)	8	67%	3 (2%)	2	67%	2.24*
Clarity of Vision	9 (6%)	5	56%	5 (3%)	2	40%	0.96
Motivation and Empowerment	8 (5%)	4	50%	5 (3%)	1	20%	0.72
Technology Considerations	4 (3%)	0	0%	7 (5%)	2	29%	-1.04
Data Driven Decision Making	5 (3%)	3	60%	5 (3%)	2	40%	-0.12
Project Constraints	3 (2%)	2	67%	7 (5%)	1	14%	-1.40
Strong Leadership	2 (1%)	1	50%	7 (5%)	5	71%	-1.80
Ability to Execute	3 (2%)	3	100%	5 (3%)	2	40%	-0.82
Executive Sponsorship	6 (4%)	0	0%	2 (1%)	2	100%	1.33
Misc	1 (1%)	0	0%	3 (2%)	0	0%	-1.08
Total	**159**	**66**	**42%**	**148**	**49**	**33%**	

As can be seen from Table 21, there are several categories with statistically significant differences between the two sub-groups as described below.

Engineering managers tend to think of team organization related topics significantly more than managers from the Product Management function (z=-1.99). This is expected, because a

big part of an Engineering manager's role in a software company is organizing their team for successful delivery.

Product Management managers tend to think of customer related topics ('Customer Focus' category) significantly more than managers from the Engineering function (z=2.40). This is expected, because the role of a product manager is externally (customer) focused by definition in a software company.

Product Management managers also tend to give higher importance to the topic of 'Organizational Alignment' than their counterparts from the Engineering function (z=2.24). This also makes sense, as product managers are the ones who typically navigate the organization to secure buy-in and budgets for their ideas and priorities.

A somewhat surprising, albeit very positive finding is that both Product Management and Engineering managers give similar importance to the Market Focus considerations.

Looking at the proportion of high importance constructs:

1. respondents from the Product Management function have more personally important constructs about 'Team Organization' (42%) than respondents from the Engineering function (23%);

2. mentioned equally by both groups, the issue of market focus matters a lot to the Product Management managers but not the Engineering mangers, as respondents from the Product Management function have more personally important constructs about 'Market Focus' (50%) than respondents from the Engineering function (7%).

As expected, focusing on managers from the Engineering and Product Management functions – who are actually responsible for defining and releasing products to market (see section 3.5.2) – has yielded a wider range of topics of importance as compared to the Pankratz & Basten (2014) study, where the focus was on project managers.

5.4.3.5. The 'Experience' Group Analysis

The question of experience was incorporated into the interviews after the pilot study was completed and was meant to shed additional light on the findings. Two sub-groups of respondents are those with more experience with exploratory innovation projects, and those with more experience with exploitative innovation projects.

Table 22. The 'Experience' group – differential analysis

(*indicates **z** significant at <0.05 and >0.01 level; ** indicates **z** significant at <= 0.01)

Category	Experience						
	Exploratory			Exploitative			ns(n)
	n	H	f(H)	n	H	f(H)	
Methodologies	36 (18%)	16	44%	19 (17%)	9	47%	0.27
Team Organization	34 (17%)	13	38%	15 (14%)	2	13%	0.88
Customer Focus	22 (11%)	4	18%	15 (14%)	3	20%	-0.59
Market Focus	22 (11%)	5	23%	8 (7%)	4	50%	1.14
Metrics	6 (3%)	3	50%	11 (10%)	2	18%	-2.52*
Clarity of Objectives and Outcomes	12 (6%)	6	50%	5 (5%)	3	60%	0.60
Organisational Alignment	9 (5%)	5	56%	6 (5%)	5	83%	-0.32
Clarity of Vision	10 (5%)	4	40%	4 (4%)	3	75%	0.60
Motivation and Empowerment	6 (3%)	0	0%	7 (6%)	5	71%	-1.36
Technology Considerations	9 (5%)	2	22%	2 (2%)	0	0%	1.26
Data Driven Decision Making	3 (2%)	2	67%	7 (6%)	3	43%	-2.26*
Project Constraints	4 (2%)	1	25%	6 (5%)	2	33%	-1.60
Strong Leadership	9 (5%)	6	67%	0 (0%)	0	0%	2.29*
Ability to Execute	4 (2%)	4	100%	4 (4%)	1	25%	-0.83
Executive Sponsorship	6 (3%)	2	33%	2 (2%)	0	0%	0.67
Misc	4 (2%)	0	0%	0 (0%)	0	0%	1.51
Total	**196**	**73**	**37%**	**111**	**42**	**38%**	

As can be seen from Table 22, there are several categories with statistically significant differences between the two sub-groups as described below.

Participants from the Exploratory sub-group gave significantly higher importance to issues in the 'Strong Leadership' category(z=3.02). On the other hand, participants from the

Exploitative category gave significantly higher importance to issues of 'Metrics' (z=-2.52) and 'Data Driven Decision Making' (z=-2.26). Looking at the actual constructs, the difference in metrics comes mainly from the fact that managers with more exploitative experience consider revenue-based metrics to be of higher importance. This makes sense for more exploitative projects, as discussed in section 2.4.3.

Looking at the proportion of high importance constructs:

1. respondents with more exploratory experience have more personally important constructs about 'Team Organization' (38%) than respondents with more exploitative experience (13%).
2. respondents with more exploratory experience have more personally important constructs about 'Metrics' (50%) than respondents with more exploitative experience (18%).
3. respondents with more exploitative experience have more personally important constructs about 'Market Focus' (50%) than respondents with more exploratory experience (23%).

With the increase in familiarity with Lean Startup approaches (see Innovation Leader, 2016; McClure, 2007; Ries, 2017) one of the more surprising findings is that user and customer traction metrics have not been mentioned by the respondents from the Exploratory sub-group.

5.4.4. Analysis of Sub-Groups Summary

Four groups were reviewed, each with two sub-groups. While the Level group was initially the focus of this study, three additional groups were analysed: Company, Function, and Experience. While not many differences between the levels were observed, experience with exploratory vs. exploitative innovation projects as well as the function (Product Management vs. Engineering) shaped out as leading indicators of differences in construing of issues of importance for project success.

Several findings are worth mentioning:

1. The Company Group
    a. Differences in focus on market can be attributed to the different ways these companies operate with respect to the product development lifecycle. Company A mostly relies on in-house product development, while Company B heavily relies on the partner and developer community to develop and release their offerings (in addition to in-house development).
2. The Level Group
    a. Ability to execute was the only topic with statistically significant difference in between the Strategic and Tactical sub-groups.
    b. Data-driven decision making may not be as important to the Strategic sub-group.
    c. The lack of differences in construing across most of the categories is promising in the context of the Agency problem: alignment between the managers in strategic and tactical levels is critical to a company's success. Yet, a misalignment on the topic of team's ability to execute may lead to a potential agency issue.
3. The Function Group
    a. Several differences in construing were found between managers from the Product Management and Engineering functions. All differences made sense to the researcher as a practitioner, as these reflected the focus areas for managers in these roles.
    b. A surprising, yet positive finding was that Market Focus considerations were equally important to managers from both functions. An additional insight from applying the Honey's technique shows that managers from the Product Management function had more constructs of personal importance when it came to market focus (50%) as opposed to their counterparts from Engineering (7%).
    c. Focusing on managers from these two functions has allowed to provide a richer set of findings as compared to the Pankratz & Basten (2014) study. For

example, topics such as ‘Methodologies’, ‘Team Organization’, ‘Ability to Execute’, and ‘Market Focus’ have not come up in their interviews, which is expected given their focus on project managers.

4. The Experience Group

    a. Three significant differences were found in this group, which ties it with the ‘Function’ group in terms of the number of most significant differences.

    b. Customer and user traction metrics were not mentioned by the respondents from the Exploratory sub-group. This finding is both surprising and alarming and may be a result of the existing metrics schemes that are entrenched in the case companies (e.g. metrics focused on revenue might be expected for any project).

5.4.5. Cognitive Complexity Analysis

Cognitive complexity is of interest in the context of research on innovation and entrepreneurship, in relation to cognitive ambidexterity as argued in sections 2.5.1 and 2.5.4. Further, cognitive complexity may influence the flexibility with which issues are construed and re-construed and may indicate propensity for creativity and innovative problem solving (see section 2.5.5.3). According to Xu (2011) entrepreneurs have more complex cognitive structures than non-entrepreneurs. It could be sensible to assume that managers with more experience in new product development (those in ‘Exploratory’ category) would exhibit similar characteristics as entrepreneurs in the above-mentioned studies, as compared to managers with more experience in incremental innovation (those in ‘Exploitative’ category). That said, a mere experience with exploratory project does not make one an entrepreneur. For example, Xu (2011) specifically focused on startup organizations in his research, rather than on managers engaged in corporate entrepreneurship, and Taylor (2017) makes a clear distinction between senior managers and entrepreneurs, the latter following Schumpeter’s definition of an entrepreneur as an innovator who founded a business (see Taylor, 2017). As a result, drawing any parallels between expectations from entrepreneurs and from the corporate managers with more experience with exploratory projects may not be plausible.

Following the procedure outlined in section 3.4.1.3, a measure of cognitive complexity was calculated as % variance accounted for by the first two components in each grid.

Table 23. Cognitive Complexity by Experience Type

Experience Type	**% Variance Accounted for by the First 2 Principal Components**		
	Lowest	**Highest**	**Mean**
More Experience with Exploratory Projects, n=16	57.9	81.9	74.5
More Experience with Exploitative Projects, n=9	61.3	86.0	74.7

The lowest % variance was 57.9%, indicating the highest cognitive complexity on this issue across the sample, while the highest % variance was 86.0%, indicating the lowest cognitive complexity on this issue across the sample. Additionally, 21 out of 25 respondents have % variance accounted for by the first two components lower than 80%, indicating that the majority of the respondents have relatively high cognitive complexity.

Contrary to the assumption made above, Xu's findings didn't translate to higher cognitive complexity of managers with more experience with exploratory projects in this study's sample.

5.5. Element Analysis

Section 5.3 has focused on findings that help answer the main research question. The main question was focused on the overall construing: what issues are important to the respondents as they think of all their projects – both exploratory and exploitative. Consequently, the main construct analysis was done without differentiating between the types of project and looked at construing holistically.

This section focuses on findings that will help answer the following supporting question: "*What issues do they construe as more important in achieving success of exploitative as opposed to exploratory innovation projects?*".

5.5.1. Ideal Elements as a Proxy for Preferred Individual Projects

A typical approach for addressing this kind of question, would involve supplying an 'ideal' element and comparing ratings of other elements to the ratings of the 'ideal' element, in that identifying elements most similar to the 'ideal' (see Jankowicz, 2004). However, aggregating the outcomes across the sample to indicate which elements represent most successful exploitative and exploratory projects for the sample as a whole was not possible in this research, since each respondent has proposed 6 unique projects from their own past or current experiences and these may be different across different respondents (see section 3.4.1.1).

An alternative procedure, based on difference in ratings between the two 'ideal' elements on each of the constructs, following the generic approach advocated by Fransella et al. (2003, pp. 99-100), was adopted as described in section 5.5.2. below.

As a good practice in Repertory Grid interviewing, at the end of each interview, the researcher reviewed the ratings across the grid, and identified one exploitative project that was the closest in ratings to an ideal exploitative project, and one that was the furthest from an ideal exploitative project. A similar exercise was repeated for exploratory projects. Next, the interviewee was asked to assess whether the claim of a particular project being the closest or furthest to/from an ideal resonated with them. In all instances the interviewees have confirmed the assessment. This in itself offers one of several forms of triangulation 'built-in' into the Repertory Grid technique.

5.5.2. Differences Between Ideal Element Ratings

With the rating scale of 1 to 5 (see section 3.4.1.1) differences of 2 points or more between Ideal Exploitative and Ideal Exploratory were considered across all constructs.

Table 24. Examples of Constructs with Two or More Points Difference

Construct ID	Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
ATEI12-4	Fixed scope, non-negotiable	Flexibility in scope, in terms of ability to move items in and out of scope throughout development	2	4
BSEX8-4	A deep technological and market expertise	Not a lot of depth of product specific knowledge with respect to tech and market	1	4

The analysis then proceeded as follows:

1. For each of the definitive content analysis categories, the total number of constructs, N, and the number of constructs, f, which had a difference of 2 or more rating scale points between the two 'Ideal' elements were identified.
2. A proportion, f/N, was calculated to provide an indication of the relative importance of the categories in differentiating between ideal exploitative and exploratory projects.

For example, the 'Methodologies' category had f=20 constructs with two or more points difference out of N=55 constructs in all, giving an f/N of 36.4% (see Table 25 below) In contrast, the 'Technology Considerations' category had f=8 and N=11 giving f/N as 72.7%. The f/N value indicates something that the simple f count does not: that it might be more important to the respondents to differentiate between technology considerations rather than methodologies, when they think about differences between the two project types – exploitative and exploratory. Table 25 presents the breakdown across all 15 categories.

Table 25. Difference Between Ideal Exploitative and Ideal Exploratory Elements

	Number of Constructs with Two or More Points Diff	**Proportion of all constructs in a category**	
Category	**f**	**N**	**f/N**
Methodologies	20	55	36.4%
Team Organization	18	49	36.7%
Market Focus	13	30	43.3%
Customer Focus	12	37	32.4%
Metrics	11	17	64.7%
Technology Considerations	8	11	72.7%
Motivation and Empowerment	5	13	38.5%
Clarity of Objectives and Outcomes	5	17	29.4%
Strong Leadership	4	9	44.4%
Executive Sponsorship	3	8	37.5%
Project Constraints	3	10	30.0%
Ability to Execute	3	8	37.5%
Clarity of Vision	3	14	21.4%
Data Driven Decision Making	2	10	20.0%
Organisational Alignment	2	15	13.3%
Misc	2	4	50.0%
Total	**115 37.5%**	**307 100%**	

Appendix 4 displays ratings for ‘ideal exploratory’ and ‘ideal exploitative’ across all constructs.

When considering the proportion of constructs with 2+ points differences in an overall number of constructs in a given category (see the last column in Table 25), several observations can be made. The issues of technology and metrics have noticeably higher representation, with 72.7% and 64.7% respectively, indicating that managers may be giving higher importance to differences in approaches in these two categories. At the same time, the issues of clarity of vision, data driven decision making, and organizational alignment have noticeably lower representation with 21.4%, 20.0%, and 13.3% respectively, indicating that managers give lower importance to differences in approaches in these three categories.

Overall, this finding is positive, and is aligned with the recommendations made by multiple scholars and practitioners to apply different approaches to managing exploratory innovation projects (see Baghai et al., 2000; Blank, 2015; Ries, 2011; Teece, 2016), as discussed in section 2.4.2.2.

5.5.3. Analysis of Sub-Groups

To shed more light on the findings described in section 5.5.2, this section will focus on the differential analysis across the four groups ('Company', 'Level', 'Function', and 'Experience').

The analysis will provide insight into differences in the extent to which the sub-groups differentiate between approaches for ideal exploratory and ideal exploitative projects. As discussed in section 5.4.3.1, the focus will be on categories with the most constructs.

To continue with the approach taken in section 5.5.2, each '*f/N*' ratio will be calculated for each sub-group, where ***f*** is the number of constructs with 2+ points rating difference between the ideal projects, and N is the total number of constructs.

Additional insight will be provided by offering examples of constructs of high personal importance (those rated as H following Honey's technique) with the respective ratings of ideal projects for those categories where substantial differences between the '*f/N*' ratios are observed.

5.5.3.1. The 'Company' Group Analysis

Table 26. The 'Company' group – differential analysis

Category	Company					
	A			B		
	N	f	f/N	N	f	f/N
Methodologies	36	9	25%	19	11	55%
Team Organization	23	7	30%	26	11	61%
Customer Focus	24	8	33%	13	4	31%
Market Focus	8	5	63%	22	8	36%
Metrics	13	8	62%	4	3	75%
Clarity of Objectives and Outcomes	6	2	33%	11	3	27%
Organisational Alignment	9	1	11%	6	1	17%
Clarity of Vision	7	1	14%	7	2	29%
Motivation and Empowerment	6	3	50%	7	2	29%
Technology Considerations	5	4	80%	6	4	67%
Data Driven Decision Making	9	1	11%	1	1	100%
Project Constraints	7	2	29%	3	1	33%
Strong Leadership	6	3	50%	3	1	33%
Ability to Execute	4	2	50%	4	1	25%
Executive Sponsorship	2	2	100%	6	1	17%
Misc	1	0	0%	3	2	67%
Total	**166**	**58**	**35%**	**141**	**56**	**40%**

As can be seen in Table 26 above, managers from Company B differentiate more often (55%) in the extent to which methodologies apply for ideal exploratory and ideal exploitative projects than managers from Company A (25%). The following are examples of constructs of high personal importance with 2+ points difference in ratings of ideal projects in this category.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Assigned smaller more concrete coding tasks	More elaborate project management and overall project strategy	1	5
Improving quality and usability, minimizing defects and Support escalations	Optimizing ongoing operations	1	3
Released very infrequently without a set cadence (once a year or less)	Released more frequently on a set schedule (twice year)	3	5

Managers from Company B differentiate more often (61%) in the extent to which concerns of team organization apply for ideal exploratory and ideal exploitative projects than managers from Company A (30%). The following is an example of constructs of high personal importance with 2+ points difference in ratings of ideal projects in this category.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Small and highly qualified self-directed team	Ad-hoc team, more junior, less domain knowledge	3	1

Despite the fact that managers from Company B did give higher importance to issues of market focus (see section 5.4.3.2), managers from Company A differentiate more often (63%) in the extent to which concerns of market focus apply for ideal exploratory and ideal exploitative projects than managers from Company B (36%). The following are examples of constructs with 2+ points difference in ratings of ideal projects in this category. None of these constructs were of high personal importance.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Solution that addresses a market need	Solution has no target market, done for the sake of being done	1	3
Follow existing Go To Market motion	Changing the Go To Market Approach	1	3
A clear vision about what market we are going after	Less clarity about target market	1	3

5.5.3.2. The 'Level' Group Analysis

Table 27. The 'Level' group – differential analysis

Category	Level					
	Strategic			Tactical		
	N	f	f/N	N	f	f/N
Methodologies	29	10	34%	26	10	38%
Team Organization	25	9	36%	24	9	38%
Customer Focus	18	8	44%	19	4	21%
Market Focus	17	8	47%	13	5	38%
Metrics	7	3	43%	10	8	80%
Clarity of Objectives and Outcomes	10	2	20%	7	3	43%
Organisational Alignment	8	1	13%	7	1	14%
Clarity of Vision	8	2	25%	6	1	17%
Motivation and Empowerment	5	3	60%	8	2	25%
Technology Considerations	7	5	71%	4	3	75%
Data Driven Decision Making	2	0	0%	8	2	25%
Project Constraints	3	1	33%	7	2	29%
Strong Leadership	6	3	50%	3	1	33%
Ability to Execute	1	1	100%	7	2	29%
Executive Sponsorship	5	2	40%	3	1	33%
Misc	2	0	0%	2	2	100%
Total	**153**	**58**	**38%**	**154**	**56**	**36%**

As can be seen in Table 27 above, strategic managers differentiate more often (44%) in the extent to which concerns of customer focus apply for ideal exploratory and ideal exploitative projects than tactical managers (21%). The following are examples of constructs of high personal importance with 2+ points difference in ratings of ideal projects in this category.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Customer partnership and commitment from day 0 (customer got stock)	Solution developed in-house then looked for a market	3	1
In person customer discovery	Aggregate customer data	4	1
Customer-driven input early in the project	Customer input/validation before shipping	3	1

Tactical managers differentiate more often (80%) in the extent to which metrics apply for ideal exploratory and ideal exploitative projects than strategic managers (43%). The following are examples of constructs with 2+ points difference in ratings of ideal projects in this category. None of these constructs were of high personal importance, and they are low in number for both groups.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Revenue-based success metrics	Did not focus on revenue as a metric	2	4
Came as a ground up initiative from the team	Driven by management / execs	2	4
Sales driven, targeted on opportunity	Greenfield development through customer discovery	2	5

5.5.3.3. The 'Function' Group Analysis

Table 28. The 'Function' group – differential analysis

Category	Function					
	Product			Engineering		
	N	f	f/N	N	f	f/N
Methodologies	25	9	36%	30	11	37%
Team Organization	19	9	47%	30	9	30%
Customer Focus	26	7	27%	11	5	45%
Market Focus	16	5	31%	14	8	57%
Metrics	10	6	60%	7	5	71%
Clarity of Objectives and Outcomes	10	4	40%	7	1	14%
Organisational Alignment	12	1	8%	3	1	33%
Clarity of Vision	9	2	22%	5	1	20%
Motivation and Empowerment	8	1	13%	5	4	80%
Technology Considerations	4	4	100%	7	4	57%
Data Driven Decision Making	5	0	0%	5	2	40%
Project Constraints	3	1	33%	7	2	29%
Strong Leadership	2	0	0%	7	4	57%
Ability to Execute	3	1	33%	5	2	40%
Executive Sponsorship	6	3	50%	2	0	0%
Misc	1	0	0%	3	2	67%
Total	**159**	**53**	**33%**	**148**	**61**	**41%**

Even though Engineering managers gave more importance to concerns of team organization (see section 5.4.3.4), as can be seen in Table 28 above, Product Management managers differentiate more often (47%) in the extent to which issues of team organization apply for ideal exploratory and ideal exploitative projects than Engineering managers (30%). The following are examples of constructs with 2+ points difference in ratings of ideal projects in this category. None of these constructs were of high personal importance.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Harder to make changes on the fly due to large amount of communication	Easier to make changes on the fly	3	5
Small cross-functional teams were formed to explore	Existing teams executed	5	1

Even though Product Management managers gave more importance to concerns of customer focus (see section 5.4.3.4), Engineering managers differentiate more often (45%) in the extent to which issues of customer focus apply for ideal exploratory and ideal exploitative projects than Product Management managers (27%). The following are examples of constructs with 2+ points difference in ratings of ideal projects in this category. None of these constructs were of high personal importance.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Frequent customer feedback throughout development	Customer feedback after launch	5	1
Responses to existing customer requests	Due to prospect or potential customer request	2	4

Engineering managers differentiate more often (57%) in the extent to which issues of market focus apply for ideal exploratory and ideal exploitative projects than Product Management managers (31%). The following are examples of constructs of high personal importance with 2+ points difference in ratings of ideal projects in this category.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Requirements were driven by market analysis	Requirements were fairly specific	4	2
Solution that addresses a market need	Solution has no target market, done for the sake of being done	1	3

5.5.3.4. The 'Experience' Group Analysis

Table 29. The 'Experience' group – differential analysis

Category	Experience					
	Exploratory			Exploitative		
	N	f	f/N	N	f	f/N
Methodologies	36	14	39%	19	6	32%
Team Organization	34	11	32%	15	7	47%
Customer Focus	22	10	45%	15	2	13%
Market Focus	22	11	50%	8	2	25%
Metrics	6	3	50%	11	8	73%
Clarity of Objectives and Outcomes	12	2	17%	5	3	60%
Organisational Alignment	9	2	22%	6	0	0%
Clarity of Vision	10	3	30%	4	0	0%
Motivation and Empowerment	6	4	67%	7	1	14%
Technology Considerations	9	6	67%	2	2	100%
Data Driven Decision Making	3	1	33%	7	1	14%
Project Constraints	4	1	25%	6	2	33%
Strong Leadership	9	4	44%	-	0	0%
Ability to Execute	4	2	50%	4	1	25%
Executive Sponsorship	6	2	33%	2	1	50%
Misc	4	2	50%	-	0	0%
Total	**196**	**78**	**40%**	**111**	**36**	**32%**

As can be seen in Table 29 above, managers with more exploratory experience differentiate more often (45%) in the extent to which concerns of customer focus apply for ideal exploratory and ideal exploitative projects than managers with more exploitative experience managers (13%). The following are examples of constructs of high personal importance with 2+ points difference in ratings of ideal projects in this category.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Customer partnership and commitment from day 0 (customer got stock)	Solution developed in-house then looked for a market	3	1
In person customer discovery	Aggregate customer data	4	1
Customer-driven input early in the project	Customer input/validation before shipping	3	1

Managers with more exploratory experience differentiate more often (50%) in the extent to which issues of market focus apply for ideal exploratory and ideal exploitative projects than managers with more exploitative experience managers (25%). The following are examples of constructs with 2+ points difference in ratings of ideal projects in this category. None of these constructs were of high personal importance.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Thorough market analysis was done	No market analysis	4	2
Market was not ready for the product	Market was ready for the product	5	3

Managers with more exploitative experience differentiate more often (60%) in the extent to which issues of clarity of objectives and outcomes apply for ideal exploratory and ideal exploitative projects than managers with more exploratory experience managers (17%). The following are examples of constructs of high personal importance with 2+ points difference in ratings of ideal projects in this category.

Emergent Pole	Implicit Pole	Ideal Exploitative	Ideal Exploratory
Had clear business problems to be solved	Open scope, no boundaries, business problem too broad	1	3
Had clear goals about project outcome, definition of success	Did not have clear goals or definition of success	1	3

5.5.3.5. Differential Analysis Summary

In this section a differential analysis was performed across the four groups of interest, to shed light on the initial element analysis and help answer the supporting research question.

Expanding on the finding that managers differentiate in the extent to which the approaches apply to exploratory and exploitative projects, it was further observed that sub-groups (Company A vs. Company B; 'Strategic' vs 'Tactical'; 'Product Management' vs. 'Engineering'; 'Exploratory' vs. 'Exploitative') exhibit differences in how often various issues of importance apply to the different types of project. The implication is, that faced with a similar situation in the future, these sub-groups of managers will tend to differ in the extent to which they apply various approaches.

With alignment between levels being the focus of this study, it is worth exemplifying this difference between the 'Strategic' and 'Tactical' sub-groups in particular. While both strategic and tactical managers agree on what is important for project success (with 'Ability to Execute' being the only category with difference in construing – see Table 20), they may disagree on the extent to which approaches differ between the ideal exploratory and ideal exploitative project (with categories of 'Customer Focus' and 'Metrics' showing difference in construing – see Table 27).

5.6. Analysis Summary

Several interesting findings emerge from the analysis so far:

1. Looking at construing of success of both the exploratory **and** exploitative projects holistically with respect to answering the main research question "*How do middle managers at different levels construe exploitative and exploratory innovation projects?*":
    a. There are minor differences in how managers from the Tactical and Strategic sub-groups construe issues related to successful outcomes of exploitative and exploratory projects. This finding is a very positive for the case companies, as it indicates alignment in how managers throughout the hierarchy construe project success.

b. ‘Function’ and ‘Experience’ are two groups with most (3) differences in construing with statistical significance at 95% significance.

c. There are no major differences in how managers construe metrics with respect to exploitative and exploratory projects, except for the managers with more exploitative innovation experience, who mentioned revenue-based metrics more often. Few people have mentioned traction-based metrics that would typically be important for exploratory projects.

d. It is surprising to see the proportion of constructs dealing with Risk Management being low and being mentioned by fewer than half the respondents.

2. Looking at the construing of success of exploratory projects **versus** exploitative projects with respect to answering the supporting research question: “*What issues do they construe as more important in achieving success of exploitative as opposed to exploratory innovation projects*?”:

   a. Almost all the respondents have differentiated between the success of exploratory projects and success of exploitative projects.

   b. The differences can be observed across all the 15 categories, indicating that the entire spectrum of issues concerning project success is considered as managers construe exploratory projects versus exploitative projects.

   c. With respect to the issue of alignment, it was observed that while both strategic and tactical managers mostly agree on what is important for project success, they may disagree on the extent to which some approaches differ between the ideal exploratory and ideal exploitative projects.

   d. The difference in construing between the two project types mainly comes from the difference in function and experience.

   e. Although there are clear differences in how managers construe exploitative versus exploratory projects, it is surprising to see that those differences rarely reference exploratory innovation-specific techniques and metrics.

And so, it appears that:

1. there is mostly alignment throughout the hierarchy on issues of importance for a successful project outcome;
2. managers do differentiate between approaches used for exploratory innovation projects vs. approaches used for exploitative innovation projects;
3. managers from different sub-groups may disagree in the extent to which some approaches apply for exploratory innovation projects vs. exploitative innovation projects;
4. there is little to no consideration given to exploratory-innovation specific metrics or management approaches;
5. experience and function are leading indicators for differences in managers' sensemaking.

These emergent findings will provide a basis for stage 2 of the study (see section 3.4.2), where they will be examined and elaborated further, prior to drawing final conclusions and recommendations.

5.7. Triangulation

5.7.1. Introduction

The importance of triangulation in case study research stems from the need to achieve rigour and was discussed in sections 3.4.1 and 3.3.2. As reviewed in section 3.4.2, Key Informant Interviews (KII) technique was chosen to examine the findings from stage 1 of the main study.

Findings summarized in section 5.6 can be expressed with the following areas of focus:

1. **Alignment across levels**. The initial indication is that there is an alignment throughout the hierarchy on issues of importance for setting projects (both exploratory and exploitative) for a successful outcome. The implication of this finding is generally positive and should lead to fewer agency issues. The KII technique was used to examine what implications for practice key informants expect from this finding.

2. **Differentiation between approaches used for the two types of innovation**. At first glance this finding seems very positive, as managers recognize the differences between the project types, and apply different approaches to them. The KII technique would be used to examine whether different approaches are being applied in practice.

3. **Prominence of exploratory innovation-specific approaches**. Managers differentiate between the type of approaches to be used for exploratory vs. exploitative innovation projects, and that differentiation can be observed in differences of ratings (see section 5.5.2). However, looking closer at the constructs themselves, the exploratory innovation-specific metrics and techniques don't seem to be used often. The KII technique will focus on why this might be the case, and the impact managers expect on project outcomes.

4. **Experience and function as the leading indicators for differences in construing**. The KII technique will be used to examine the reasons for this, and what the implications might be.

Sections 5.7.3 and 5.7.4 describe the informant characteristics and interview questions chosen to examine these areas of focus further.

5.7.2. Informant Selection

According to Tremblay (1957), the key criterion for informant selection and eligibility to participate in the interviews is exposure to the kind of information being sought.

Homburg et al. (2012) argue that tenure at the company leads to higher reliability of key informants. They also argue that the higher is the position in a company's hierarchy, the higher is the reliability of the informant.

To explore the areas of focus (see section 5.7.1) further, managers with the following minimum required characteristics were chosen from the original sample:

1. At least 2 years in the current company. These managers would have observed how multiple projects have been approached across the company and have interacted with other managers across the company.

2. Strategic level (Sr. Directors and VPs). These managers typically have visibility into projects across the company, not just the ones in their purview.

3. Managers with more experience with exploratory projects. These managers would be able to comment on specific experiences with exploratory projects that shaped their view of what makes exploratory projects successful. They would also be able to comment on the lack of use of exploratory innovation techniques and metrics.

Additionally, due to the nature of the preliminary findings, it was important to select some informants that have had startup experiences prior to their career in a large established company; who have, ideally, held leadership positions when they released brand new products; who have had wide exposure to the various teams and business units in their current companies; and people with both Product Management and Engineering experience.

Table 31 in section 5.7.4 below lists the informants and characteristics they have been selected for (in addition to the minimum criteria listed above).

5.7.3. Interview Questions

Table 30 below maps questions to each of the findings given in the Analysis Summary shown in section 5.6. Each question was accompanied by a flashcard showing the interviewee the relevant data.

Table 30. Focus Areas and Questions for Key Informant Interviews

Focus Area	Questions
Alignment across levels	It appears that both strategic and tactical managers think about similar issues of importance when it comes to setting up a project for a successful outcome. – Is this surprising? – Does it get reflected in outcomes? – What implications to you expect to see from this finding?
Differentiation between approaches used for the two types of innovation	Almost all the respondents have differentiated between the type of issues that are important to the success of exploratory innovation projects vs. success of exploitative innovation projects. – Why do you think that is? – Is it surprising? – Does it matter to the work they do? – In what way is it reflected in outcomes?
Prominence of exploratory innovation-specific approaches	It doesn't seem like managers leading exploratory innovation projects apply exploratory innovation-specific approaches. For example, I noticed was that people were using traditional revenue-based metrics– the sort you'd associate with exploitative innovation projects– rather than customer and user traction-focused metrics. – Why do you think this might be the case? – Is that an issue? – (If so), what might we be doing about it? Additionally, very few Lean Startup approaches (e.g. hypothesis-based experimentation) were mentioned. – Why do you think this might be the case?. – Is that an issue? – (If so), what might we be doing about it?
Experience and function as the leading indicator for differences in construing	It appears that people whose experience has been largely with Exploratory projects tend to think differently from people whose experience has been largely incremental. – Do the differences make sense? – Can you recall a particular experience you had with an exploratory project that changed how you approach setting up a project for success?

After answering these questions, the informants were asked to review the results of the differential analysis (a simplified version of the table in Appendix 9) and comment on any surprises, such as missing categories, or differences between sub-groups. Appendix 12 shows the interview guide.

5.7.4. Procedure and Sample Overview

Informants were contacted via e-mail with a request to conduct a follow-up interview, and the reason for the follow-up was explained. A preliminary findings report (see Appendix 13) was shared with all the respondents. All interviews were recorded using GoToMeeting (https://www.gotomeeting.com/). This approach was used with both the remote and in-person attendees, since GoToMeeting produces an automatic transcript of the entire interview. This aided the researcher in saving time to transcribe these sessions. All informants were asked for consent prior to the recording and were promised that the recording would be deleted after the transcript was obtained.

As mentioned in section 5.7.2, all informants are from the strategic level and with more experience with exploratory innovation projects. Out of 10 managers contacted, 9 responded and participated in this round.

Table 31. Key Informant Interviews – Informants

ID	Company	Function	Position	Additional Characteristics
ASPX-2	A	Product	VP	Long tenure at the current company; Exposure to multiple Business Units; Recent experience bringing a new product to market.
ASPX-5	A	Product	VP	Long tenure at the current company; Exposure to multiple Business Units; Recent experience bringing a new product to market; Held both Product and Engineering positions.
ASEX-6	A	Engineering	VP	Serial entrepreneur prior to the current company; Long tenure at the current company.
ASEX-7	A	Engineering	Sr. Director	Multiple startups and large corporations experience.
ASPX-9	A	Product	VP	Track record of innovation in large corporations; Recent experience bringing a new product to market.
BSEX-1	B	Engineering	VP	Experience bringing new products to market in startups and large corporations.
BSEX-8	B	Engineering	Sr. Director	Experience bringing new products to market in startups and large corporations.
BSPX-11	B	Product	Sr. Director	Long tenure at the current company; Exposure to multiple Business Units;
BSPX-12	B	Product	Sr. Director	Long tenure at the current company; Exposure to multiple Business Units;

5.7.5. Focus Areas – Key Points from Key Informants

This section presents key points raised for each of the focus areas (see section 5.7.1 and Table 30) reviewed with the key informants.

5.7.5.1. Focus Area 1 – Alignment Across Levels

Table 32. KII Focus Area 1 ('Alignment Across Levels') Summary

Respondent	Key Points
ASPX-2 VP Product	• Overall, alignment between the levels is not surprising. • It is surprising to see that Data Driven Decision Making (DDDM) not as important to the 'Strategic' sub-group, and that there is agreement on importance of 'Organizational Alignment' between the sub-groups
ASPX-5 VP Product	• Not surprised to see the alignment, although that depends on a group in our company. • 'Ability to Execute' is low likely because strategic people might be taking it for granted. • 'DDDM' is low for the 'Strategic' sub-group because we are not good in this area, and it's harder to get data relevant to this level.
ASEX-6 VP Engineering	• Overall, alignment between the levels **is** surprising • Didn't observe tactical level managers giving importance to market focus, metrics, organizational alignment. • DDDM disparity makes sense: strategic level people do a poor job of communicating the rationale behind the decisions.
ASEX-7 Sr. Director Engineering	• Overall, alignment between the levels is not surprising, and is a good sign. • DDDM & 'Ability to Execute' may not have come up high because 'Strategic' sub-group managers take these for granted. • We are aligned on what's important, but it may not be what's happening in reality.
ASPX-9 VP Product	• Overall, alignment make sense. • 'Ability to Execute' being low is surprising, especially for the 'Strategic' sub-group.
BSEX-1 VP Engineering	• Overall, the findings make sense. • 'Ability to execute' being low for 'Strategic' sub-group may make sense, because a strategic person may expect that considerations of ability to execute would be left to tactical managers to figure out. • Would expect that 'Customer Focus' and 'Market Focus' would be at the top for 'Strategic'.
BSEX-8 Sr. Director Engineering	• Overall, the alignment is there; some smaller bits is what people argue over. • It is surprising to see that 'Ability to Execute' is low for the 'Strategic' sub-group. DDDM should be more important at the Strategic level.
BSPX-11 Sr. Director Product	• Not surprised with the finding, do observe this in the company. • Would expect that 'Tactical' managers would be more concerned with technology than the 'Strategic' managers.
BSPX-12 Sr. Director Product	• Expected consistency in how managers across the levels think about project success. • Not likely to be the case in reality due to politics and opinions.

Focus area 1 (alignment across levels) was centred around the following preliminary finding: *both strategic and tactical managers think about similar issues of importance when it comes to setting up a project for a successful outcome*.

Based on responses from key informants (see Table 32), with one exception (respondent ASEX-6) there is consensus that the alignment across levels indeed exists.

An interesting observation was offered by respondent ASEX-7:

> "*I think we are aligned on whether it is important... we just not aligned on whether it is happening: tactical level may think the objectives are unclear, strategic level might think they are perfectly clear. They both think these are important... For example, we agree that it is important to align Engineering and DevOps (Team Organization) but this still hasn't happened."* (ASEX-7)

Respondent ASPX-5 made a similar comment with respect to what is happening in reality.

Similarly, almost all informants were surprised that 'Ability to Execute' and 'Data Driven Decision Making' (DDDM) were less important to managers from the 'Strategic' sub-group:

> "*Because strategic have to process large amounts of information, and you have to make strong data driven decisions*." (ASPX-2)

A possible explanation to the disparity in 'DDDM' was suggested:

> "*I feel like data driven decision making disparity makes sense: strategic level people do a poor job of communicating the rationale behind the decisions. We need to be much crisper on how these projects align to the vision*." (ASEX-6)

Respondent ASPX-5 offered a similar explanation.

Another possible explanation to the disparity in both 'Ability to Execute' and 'DDDM':

> "*Strategic level people do care about data driven decision making and the ability to execute, so the fact this didn't come up high, is likely because strategic people take these for granted*". (ASEX-7)

Informants ASPX-5 and BSEX-1 offered a similar explanation for 'Ability to Execute'.

One possible implication of 'Ability to Execute' and 'DDDM' being less important to strategic managers was suggested:

"*If that's the case, then the tactical managers would not learn the proper behaviours from the strategic managers*." (BXES-8)

And so, it's safe to conclude that this preliminary finding is acceptable to the key informants. The implications will be further discussed in Chapter 6.

5.7.5.2. Focus Area 2 – Differentiation Between Approaches

Table 33. KII Focus Area 2 ('Differentiation Between Approaches') Summary

Respondent	Key Points
ASPX-2 VP Product	• Overall, the finding makes sense • Decisions on exploratory projects have a longer lasting impact. • Metrics need to be very different, while DDDM is important for both. • It is surprising that clarity of vision is equal for both. On exploratory project the clarity of vision is so much more important
ASPX-5 VP Product	• Overall, the finding makes sense. • 'Metrics' and 'Technology Considerations' - right on the money with respect to differences, while 'Clarity of Vision', 'DDDM', and 'Organizational Alignment' are equally important. • Would expect 'Strong Leadership' to be closer aligned between the two project types.
ASEX-6 VP Engineering	• Overall, the finding makes sense
ASEX-7 Sr. Director Engineering	• Overall, the finding makes sense • It's easier to know what to measure with exploitative projects • The technology considerations are way more important to exploratory projects • On categories with fewer differences: these are considered equally important because these are basics that need to be in place.
ASPX-9 VP Product	• Overall, the finding makes sense • Technology in exploitative projects technology doesn't change that much, so considerations would apply differently. • It makes sense that need to measure exploratory projects differently.
BSEX-1 VP Engineering	• Overall, the finding makes sense • Would expect that clarity of objectives and outcomes would be very different between the two. When you are doing something new people are asking for clarity more.
BSEX-8 Sr. Director Engineering	• Overall, the finding makes sense
BSPX-11 Sr. Director Product	• In exploratory project the metrics are less important. As project matures, metrics become more important.
BSPX-12 Sr. Director Product	• Overall, the finding makes sense • 'Motivation and Empowerment': makes sense because of different 'safety grounds' in exploratory project

Focus area 2 (Differentiation between approaches used for the two types of innovation) was centred around the following preliminary finding: *Almost all the respondents have differentiated between the type of issues that are important to the success of exploratory innovation projects vs. success of exploitative innovation projects*.

Based on responses from key informants (see Table 33), there is consensus that the finding makes sense. Most informants agreed that more of 'Metrics' and 'Technology Considerations' issues and fewer of ' Clarity of Vision', 'DDDM', and 'Organizational Alignment' issues would be different between the two project types.

As one respondent puts it:

> "*Makes sense that clarity of vision, DDDM, and org alignment had fewer constructs with different ratings, because these are 'motherhood and apple pie' so they have likely been considered equally important for both types of projects.*" (ASEX-7)

One of the respondents found it surprising that 'Clarity of Vision' was ranked similar for both types of project:

> "*Interesting that clarity of vision is equal for both. Would expect to see a larger difference because on exploratory project the clarity of vision is so much more important, and a small deviation in a vision would have a bigger impact on exploratory project.*" (ASPX-2)

A similar observation was made regarding 'Clarity of Objectives and Outcomes':

> "*Would expect that clarity of objectives and outcomes would be very different between the two. When you are doing something new people are asking for clarity more*". (BSEX-1)

And so, it's safe to conclude that this preliminary finding is acceptable to the key informants. This finding will be further analysed in conjunction with finding 3 (presented in the next section) and will be discussed more in section 5.8 The implications will be further discussed in Chapter 6.

5.7.5.3. Focus Area 3 - Exploratory Innovation Approaches

Table 34. KII Focus Area 3 ('Exploratory Innovation Approaches') Summary

Respondent	Key Points

ASPX-2
VP
Product
	• On Metrics:
	  o Revenue is an easy metric to go after
	  o For exploratory projects, need to have a hypothesis before you look at the data.
	• On Lean Startup:
	  o People may know about the Lean Starup approaches, but it's easier to fall back to what you already know.
	  o People are scared to get their hypotheses invalidated.

ASPX-5
VP
Product
	• On Metrics:
	  o It's a mistake to tie an exploratory project in early stages to revenue.
	  o We do have a history of supporting non-revenue metrics for exploratory projects.
	• On Lean Startup:
	  o Not running experiments is not healthy. Unfortunately, we do not run experiments often.
	  o The implication is that you are late to the market.
	  o To address this, we need to change culture around exploratory projects, with specific exploratory metrics, and have ways to reduce scope and release often. Need to think more like a startup.

ASEX-6
VP
Engineering
	• On Metrics & Lean Startup:
	  o People don't consciously segment exploratory vs. exploitative innovation.
	  o This is due to lack of awareness. Need an oversight to help identify the right type of the project and apply the right process.

ASEX-7
Sr. Director
Engineering
	• On Metrics:
	  o Exploitative projects are easier to measure. With exploratory you may not know how to measure yet.
	  o Some projects might be technology focused, so people might not be thinking in terms of customer and user traction.
	• On Lean Startup:
	  o People understand the concepts of Lean Startup but are not applying. It's not engrained in our culture. Companies try to be predictable in costs and results and are more conservative.
	  o A lack of recognition that these techniques can apply to a corporate innovation project.
	  o The problem with not applying these approaches is that we are going into a project with untested assumptions. We should call exploratory projects for what they are explicitly and apply a different approach deliberately. Instead, we use exact same process as for exploitative projects.

ASPX-9
VP
Product
	• On Metrics:
	  o People in startups know that the only way to drive interest from VCs is to show traction. As you mature, the revenue becomes important.
	  o This maybe a representation of a culture - we are asked to drive revenue pretty quickly - we don't have a luxury of incubating for several years. The expectation for bookings trumps other metrics. We are using active use, but it's a secondary metric. This is how we are measured.
	  o This culture of what metrics are important cascades down to lower levels.
	  o A company that is committing to the market to deliver margins will be driven by financial metrics no matter the type of a project.
	• On Lean Startup:

	○ In Enterprise software, the expectations are to create long term roadmaps and commit a year out. That leads to less flexibility to pivot. You can navigate this, but it is harder. There is inertia in the way the Enterprise software works. ○ Experimentation is difficult in the Enterprise market - harder to rip and change after release, not the same level of flexibility as with the consumer world. The way to address it is to have good Beta programs and tech previews. ○ When you have a dried-up innovation pipeline, there is a huge pressure to deliver once you are working on an innovative project. We need to improve our discovery process to front load validation. But once you are starting to execute - the pressure to deliver is high.
BSEX-1 VP Engineering	• On Metrics: ○ The approach would be based on the business of the company. • On Lean Startup: ○ I see that people are approaching both types of projects similarly. A large company might not tolerate 'science experiments' unless it's a CTO office.
BSEX-8 Sr. Director Engineering	• On Metrics: ○ Just went through an OKR process and had several non-financial metrics. We all have a revenue goal, but then we track non-financial metrics separately. • On Lean Startup: ○ It is an issue that people don't apply exploration specific methods on exploratory projects. ○ You have to either encourage people to attempt new methodologies through incentives and metrics or you have to bring "outside views" - people who've done it differently from elsewhere.
BSPX-11 Sr. Director Product	• On Metrics: ○ Regardless of the type of a project there is still some profit and loss calculation involved. ○ The user behaviour metrics are more subtle, and no one is going to ask you to report on these metrics. • On Lean Startup: ○ This is an expression of culture: it's difficult to conduct according to Lean Startup in a company that doesn't operate this way.
BSPX-12 Sr. Director Product	• On Metrics: ○ At some point everything needs to be tied to financials, but not everything can be measured financially early on. ○ Even if you are not using financial metrics you need to find a way to tie it back to financials. ○ The metrics chosen are typically match what the business unit is measured on. • On Lean Startup: ○ Real startups have constraints: time, money. In a corporate world it is easy to procrastinate. Leadership has to create artificial constraints, and in that recreate the startup-like conditions. It may affect the practicality to execute, so it's not a 'silver bullet'.

Focus area 3 (Prominence of exploratory innovation-specific approaches) was centred around the following preliminary finding: *managers leading exploratory innovation projects do not apply exploratory innovation-specific approaches*.

Based on responses from key informants (see Table 34), there is consensus that the finding makes sense. Several important interpretations (well exemplified by informant ASPX-9) seem to be thematic in their responses:

1. Managers do not explicitly distinguish between types of a project (exploitative vs. exploratory).
2. Managers may not be aware of Lean Startup approaches and fall back to "what they know".
3. Cultural norms and extant expectations may lead to a choice of techniques and metrics more appropriate for exploitative projects.

Most participants recognized that this finding is problematic for their organization, and the following suggestions were made to improve the situation:

1. Have a process for validating hypotheses and celebrate failures (ASPX-2).
2. Introduce a clear process for exploratory innovation (ASEX-6).
3. Call exploratory projects out explicitly (ASEX-7).
4. Improve the discovery and validation processes (ASEX-9).
5. Bring "outside views" – people from outside of organization (BSEX-8).
6. Tactical managers need to ask their managers (strategic managers) to hold them accountable to both financial and non-financial metrics (BSPX-11).
7. Introduce artificial constraints to resemble the startup environment (BSPX-12, ASPX-5).

And so, it's safe to conclude that this preliminary finding is acceptable to the key informants. This finding will be further analysed in conjunction with finding 2 (presented in the previous section) and will be discussed more in section 5.8. The implications will be further discussed in Chapter 6.\

5.7.5.4. Focus Area 4 – Experience as a Leading Indicator

Table 35. KII Focus Area 4 ('Experience as one of the leading indicators') Summary

Respondent	Key Points
ASPX-2 VP Product	• Overall, the finding makes sense • On 'Clarity of vision' being more important to the 'Exploratory' sub-group: having strong principles defined up front allows you to see the forest for the trees. This helps you to make decisions throughout the project.
ASPX-5 VP Product	• Overall, the finding makes sense
ASEX-6 VP Engineering	• Successful startup companies have strong methodologies, tight team, laser focus on market, novel technology, strong leader at the helm – so seeing these categories with most differences makes sense. • The differences are consistent with observations of behaviour in our company.
ASEX-7 Sr. Director Engineering	• Makes sense that people with different experiences think differently. • When we have an argument, it does come down to the differences in experience, with considerations of 'Methodologies' and 'Market Focus' being the typical ones.
ASPX-9 VP Product	• On differences in 'Methodologies: exploitative projects are simpler and more predictable, while exploratory require more tools in the toolbox. • On differences in 'Team Organization': it is easier to deal with organizational project topologies for exploitative projects. • Does not make sense that Metrics and Data driven decision making are less important to the Exploratory group, because you need to make decisions on data from validations. In fact, that may contradict the fact that methodologies are more important (as data is one of the outputs of those methodologies).
BSEX-1 VP Engineering	• Overall, completely makes sense. • Would expect that 'Customer Focus' would have less difference.
BSEX-8 Sr. Director Engineering	• Would expect that 'Technology considerations', 'Market Focus', and 'Strong Leadership' would be somewhat closer.
BSPX-11 Sr. Director Product	• Surprising that the customer focus is divergent between the sub-groups.
BSPX-12 Sr. Director Product	• Interesting that 'Market Focus' is that far apart. Even for an incremental project you want to have focus on market. • Interesting that 'Strong leadership' is not important to managers with incremental experience.

Focus area 4 (Experience as one of the leading indicators for differences in construing) was centred around the following preliminary finding: *people whose experience has been largely with Exploratory projects tend to think differently from people whose experience has been largely exploitative*.

Based on responses from key informants (see Table 35), there is consensus that the finding makes sense. As one respondent indicated:

> "*You just defined a successful startup: successful startup companies have strong methodologies, tight team, laser focus on market, novel technology, strong leader at the helm - so seeing these categories with most differences makes total sense.*" (ASEX-6)

One possible explanation was offered:

> "*Makes sense that people with different experiences think differently. Some people spent all their lives in big companies with engrained habits, vs. others may have a startup experience*." (ASEX-7)

And so, it's safe to conclude that this preliminary finding is acceptable to the key informants. This finding will be further analysed in conjunction with finding 3 (presented in the previous section) and will be discussed more in section 5.8. The implications will be further discussed in Chapter 6.

5.7.6. Key Informant Interviews Summary

Key Informant Interview technique was used in stage 2 of the study to examine four focus areas: (1) Alignment across levels, (2) Differentiation between approaches used for the two types of innovation, (3) Prominence of exploratory innovation-specific approaches, and (4) Experience and function as the leading indicator for differences in construing.

Ten informants from the 'Strategic' sub-group were selected from the original sample of 25 respondents. Nine of them responded and agreed to participate in the second stage of the study.

While all four findings made sense to most of the informants, a consistent surprise was that 'Ability to Execute' and 'Data Driven Decision Making' categories were less important to managers from the 'Strategic' sub-group.

The most interesting interpretations were offered for finding 3. Key informants suggested that exploratory innovation specific metrics and techniques are not being used because managers do not recognize the differences between projects and may not know what exploration specific approaches are. More importantly, following known approaches, and following the expectations of extant corporate culture and inertia may prevent managers from measuring the right things or applying the exploration specific approaches. The topics of

extant culture and inertia came up more strongly from informants ASEX-7, ASPX-9, BSEX-1, BSPX-11, and BSPX-12, and more subtly from informants ASPX-2 and ASPX-5 (see Table 34). Specifically, when a business as a whole, or a particular business unit is being measured with financial metrics, the expectation throughout the hierarchy is that projects (regardless of type) need to be measured with financial metrics too. Some informants (e.g. ASPX-5, BSEX-8) indicated that non-financial metrics are used at times in addition to financial ones. With respect to exploration specific approaches, a perceived intolerance of failure (ASPX-2), lack of a "startup mindset" (ASPX-5, BSPX-12), expectations of predictability of delivery and outcomes (ASEX-7, ASPX-9), industry expectations (ASPX-9), intolerance to experimentation (BSEX-1), lack of incentives (BSEX-8), lack of outside views (BSEX-8), different operational context (BSPX-11) – are some of the cultural antecedents leading to this reality.

Several interpretations and implications were offered and will be discussed further in section 5.8 and Chapter 6, in the context of the research questions.

5.8. Summary of Main Study Findings and Analysis

5.8.1. The Sequence

The main study of this thesis consisted of two stages. In stage 1 of the study 25 managers from two participating companies were interviewed and a total of 307 constructs were collected with Repertory Grid technique. These constructs were coded into 15 categories of meaning after three rounds of categorization and reliability checks.

Two levels of analysis were performed. Initially, a construct analysis was performed to answer the **main research question**: *How do middle managers at different levels construe exploitative and exploratory innovation projects?* Next, element analysis was performed to answer the **supporting question**: *What issues do they construe as more important in achieving success of exploitative as opposed to exploratory innovation projects?*

Once the preliminary findings were identified, a stage 2 of the study commenced. A subset of participants was identified as 'key informants', and asked to help examine the findings, and offer their interpretations via the Key Informant Interview technique.

5.8.2. The Findings

5.8.2.1. The Main Research Question

The intent of this question (*How do middle managers at different levels construe exploitative and exploratory innovation projects?*) was to examine construing of projects holistically, without comparison between projects types (exploratory and exploitative). The emphasis was on differences in construing between levels ('Strategic' vs 'Tactical'). Construct analysis was the main technique used to answer this research question.

Several findings help answer this research question:

1. The top three sets of considerations of high importance were found to be 'Methodologies', 'Team Organization', and 'Customer Focus', between them accounting for almost half of all constructs.
2. There is mostly alignment throughout the hierarchy on issues of importance for setting up projects (both exploratory and exploitative) for a successful outcome.
3. Experience and Function are the leading indicators for differences in construing.

In stage 2 of the study few surprises were found with these findings, and overall key informants agreed with the findings.

5.8.2.2. The Supporting Research Question

The intent of the question (*What issues do they construe as more important in achieving success of exploitative as opposed to exploratory innovation projects?*) was to look at how managers differentiate between the two types of project (exploratory vs. exploitative) in their construing. Element analysis was the main technique used to answer this research question.

Several findings help answer this research question:

1. Managers recognize that issues of importance for project success apply differently to the two project types. In essence, there is a difference in the extent to which, in the managers minds, various approaches apply to these two types of project.
2. While both strategic and tactical managers mostly agree on what is important for project success, they may disagree on the extent to which some approaches differ between the ideal exploratory and ideal exploitative projects.

3. Managers involved in exploratory projects rarely apply exploratory innovation specific approaches, such as setting exploration specific metrics and using Lean Startup approaches such as experimentation.

In stage 2 of the study these findings were examined in detail. All respondents agreed with these findings, and several interpretations were offered.

5.8.2.3. Propositions

Upon examination of these findings with key informants, the following propositions can be developed:

Proposition 1: Both 'Strategic' and 'Tactical' managers *agree* on what is important for project success, yet they may disagree on the extent to which some approaches differ between the types of project.

Proposition 2: While there is alignment on what is important, this may not be what is happening in practice.

Proposition 3: Managers with more exploratory innovation experience think differently about project success than managers with more exploitative innovation experience.

Proposition 4: Managers from the Engineering function think differently about project success than managers from the Product Management function.

Proposition 5: Managers think differently about the extent to which various considerations apply to the two project types (exploratory and exploitative).

Proposition 6: Inertia and extant corporate culture are key antecedents of managers applying exploitative approaches on exploratory projects.

These propositions, their implications, and recommendations will be discussed in Chapter 6.

6. Discussion and Conclusions

6.1. Discussion of Findings

The findings presented in this research and the six propositions derived in the previous section are a result of construct analysis at their root, followed by element analysis and interview-based triangulation. It's important to remember that this research is grounded in Personal Construct Theory (PCT), which stresses that it is much more important to understand the usefulness of a construct than to prove it is correct (see Butt & Burr, 2004). The anticipatory aspect of PCT is of key importance too: the way people construe a particular issue will indicate factors which they feel are important for successful outcomes, and hence the action they may likely take faced with a particular choice. Moreover, it is by understanding how the person construes their intentions that we understand the reasons for their departure from pure statistical rationality as outlined in the discussion of Prospect Theory in section 2.3.4.2.

As discussed in section 3.3.2, the form of generalisation sought in a case study is called 'analytic generalisation' (Yin, 2017, p. 37). It is based on purposive sampling (see section 3.5.2) and its aim is to generalise from the study (not the case) to a variety of situations, in which the same theoretical concept or principles apply.

In essence, the propositions described in section 5.8.2.3 can be generalized to other companies with exploratory and exploitative product development, where managers in the Product Management and Engineering functions seem to be in alignment throughout the hierarchy on how to drive a project to a successful outcome, yet still need to make appropriate choices of metrics and techniques and therefore need to differentiate between the project types first. Therefore, the findings may be applicable not only for B2B technology companies similar to the ones the research was performed in but also in other technology or product companies in similar circumstances.

With that clarification in mind, and without wishing to overgeneralize, the author offers his interpretations as he construes the respondents, their responses, and their interpretations of the findings, consistent with the epistemological stance of this research (see Denicolo et al., 2016; Heron, 1981).

6.1.1. Alignment on Issues of Importance

As presented in section 5.8, overall, both 'Strategic' and 'Tactical' managers agree on what is important for project success - for successful outcomes of exploitative and exploratory projects, they may disagree on the extent to which some approaches differ between the ideal exploratory and ideal exploitative project. Several aspects of this finding warrant further discussion.

First, most informants were surprised to see that considerations of 'Ability to Execute' and 'Data Driven Decision Making' (DDDM) appeared to be less important to the 'Strategic' sub-group than to the 'Tactical' sub-group. The finding seems to be alarming, since relying on data to make decisions, especially with the exploratory projects, is key to exploratory project success (see Ries, 2011, 2017) at all levels. Similarly, Dyer, Gregersen, & Christensen (2019) indicate that ability to execute is key to any innovation's success. Mintzberg (1989) claims that strategic managers should not be detached from operations. Some informants suggested the reason to be a case, where the 'Strategic' sub-group might be taking these considerations for granted, hence these considerations didn't come up as high from that group.

One of the categories where strategic managers and tactical managers didn't align in the extent to which the approaches differ between the ideal exploratory and ideal exploitative projects was 'Metrics'. As discussed in section 2.4.3.2, exploratory projects are more appropriately measured by customer and user traction metrics rather than by metrics such as revenue or meeting a date. A misalignment on how to apply metrics to different types of project may lead to agency issues (see section 2.3.4.3, esp. Eisenhardt, 1989; Freeman & Engel, 2007).

While the fact that there is mostly alignment is positive from the agency standpoint, the alignment may not be on the right aspects. If foundational elements such as structures, processes, and culture do not foster exploratory innovation approaches, then, from an exploratory innovation standpoint it may not matter that the alignment exists.

And finally, several informants indicated that while there is an alignment on what is important for project success, this may not be what, in fact, is happening in practice as managers make decisions on a regular basis. This will be discussed in section 6.3.

6.1.2. Experience and Function as Leading Indicators for Differences in Construing

As presented in section 5.8, managers with more exploratory innovation experience think differently about project success than managers with more exploitative innovation experience. Additionally, managers from the Product Management function tend to think differently about project success than managers from the Engineering function. In a sense, managers' experience is also shaped by the function they are in. Past experiences are known to impact decision making (Markowska et al., 2018). Differences in these experiences lead to differences in construing (Nooteboom 2009) especially due to differences in backgrounds (Maitlis & Christianson, 2014). Additionally, differences in experience lead to differences in dealing with personal ambidexterity tensions (Papachroni, 2013).

The first of these findings (with regards to the type of experience – exploitative vs. exploratory) is very positive for the case companies and other companies in the industry, because they could augment their hiring with managers with entrepreneurial experience, a topic that will be discussed in more detail in section 6.3. Conversely, this finding may spell trouble for a company, if managers with many years of service do not learn entrepreneurial techniques. In essence, they learn and develop heuristics (see Busenitz and Barney 1997) that may not be appropriate for the project at hand. In fact, McKenzie et al. (2009) claim that as managers advance in their careers and strategic decision making is required in conditions of uncertainty, the reliance on past experiences becomes detrimental, and more non-conventional thinking is required for these managers to succeed. As one of the key informants noted, tactical managers learn from strategic managers, so if the appropriate behaviours are not enacted by the strategic managers, these behaviours perpetuate throughout the hierarchy.

6.1.3. Lack of Application of Approaches Appropriate for Exploratory Innovation

As presented in section 5.8, while managers think differently about the extent to which various considerations apply to the two project types (see *Proposition 5*), inertia and extant corporate culture are viewed as key antecedents of managers applying exploitative approaches on exploratory projects (see *Proposition 6*).

As it stands, this finding is perhaps the most problematic for the case companies, because, if managers resort to the project toolkit used for traditional projects, they may deliver something that customers won't need or won't be ready to pay for, inevitably leading to a

project's failure (Cagan 2017; Baghai et al., 2000; Leifer et al., 2000; Quinn, 1985; Teece, Peteraf, & Leih, 2016). Additionally, as outlined in the Cynefin framework (see section 2.4.1, esp. Snowden & Boone, 2007), most exploratory innovation projects fall into the 'Complex' domain, and experimentation ('probing' in the Cynefin terminology) is required to bring projects from the 'Complex' domain to the 'Complicated' domain, where more traditional approaches could apply.

For the most part, this finding is supported by the literature. Organisational inertia leads to perpetuation of the old ways of doing things (see Assink, 2006; Blindenbach-Driessen et al., 2010; Büschgens et al., 2013; Kristiansen & Ritala, 2018; Sharma, 1999; Tushman, 1997). Experimentation is key to innovation (Dyer, Gregersen & Christensen, 2019; Ries, 2011, 2017), yet adoption of Lean Startup method in companies is challenging when executives are looking for financial metrics and for a fast ROI (Innovation Leader, 2016), and innovation teams are under pressure to predict revenues from disruptive innovation in early stages (Assinnk, 2006). The latter has also been indicated by several key informants as the reason for why exploration-appropriate approaches are not being used.

A study by Karhu (2017) seems at odds with these findings. Karhu looked at the cognitive processes that occur as managers make sense of their situation and choose the optimal choice alternative required to resolve a problem, bearing in mind the context involved. One possible reason for the discrepancy with the above findings is that Karhu's study focused only on the idea generation stage of new product development and did not cover the entire product lifecycle.

As discussed in section 5.7.6, several cultural norms (see section 2.2.1.3) can be viewed as antecedents of application of exploitation-appropriate techniques and metrics on exploratory projects:

1. Expectation to align metrics of a project to metrics the business is measured on;
2. a perceived intolerance of failure;
3. a lack of the "startup mindset";
4. expectations of predictable delivery and outcomes;
5. perceived industry expectations;
6. intolerance to experimentation

7. lack of incentives;
8. lack of outside views;
9. different operational context at a broader organizational level.

The above findings align with inhibitors of innovation discussed in section 2.2.1.3.

Ultimately, the inability to detect the relevant context (see section 2.4.1), and the choice of metrics and techniques that are not appropriate in particular circumstances may lead to suboptimal performance (see Locke et al., 2002; McGrath, 2013; Mumford & Licuanan, 2004).

6.2. Implications for Theory

This research makes contributions to the fields of ambidexterity, project management, managerial sensemaking, and Repertory Grid Technique, as described below.

6.2.1. Ambidexterity

This study reported the perceived factors inhibiting exploratory innovation (see section 6.1.3). These factors align with findings of Antoncic (2003), Büschgens et al. (2013), Deal & Kennedy (1982), Naranjo-Valencia et al. (2011), Tian et al. (2018), and adds to them, by offering several additional inhibitors, namely: lack of outside views, a lack of the "startup mindset", and perceived industry expectations.

Organizational ambidexterity has been researched by various scholars at three different levels: firm, project, and individual (Andriopoulos & Lewis, 2009). Most extant research focuses on the firm level, and relatively little is known on ambidexterity on the individual level. This research answers calls of multiple researchers to examine issues related to individual ambidexterity (see Andriopoulos & Lewis, 2009; Bonesso et al., 2014; Papachroni, 2013; Raisch et al., 2009; Schnellbächer, Heidenreich, & Wald, 2019; Xiang et al., 2019).

Andriopoulos & Lewis (2009) argue that ambidexterity needs to be managed throughout the hierarchy, at each level, leading to reinforcement of ambidexterity in a company. The present research illuminates how managers at each level (strategic vs. tactical – a categorization implied by Andriopoulos & Lewis (2009, p.708)) think about exploratory innovation and

exploitative innovation projects. *Proposition 1* indicates a high degree of agreement throughout the hierarchy on issues of importance with some differences on the extent to which the approaches differ between the types of project, while *Proposition 2* suggests that what is implemented in reality may not align with the manager's sensemaking.

Bonesso et al. (2014) focused on the issue of enactment of ambidexterity as opposed to perceived ambidextrous behaviour by the individuals. They concluded that full personal ambidexterity – where behaviours and perceptions are fully aligned – is not easily achieved due to a cognitive dissonance between employees' expectations from their role and their enacted behaviours with respect to exploration and exploitation. Bonesso et al. (2014) suggested that one reason might be a lack of clarity in setting the employees' role expectations. The present study, especially propositions 4 and 5, offers additional insight into this topic: while multiple participants seemed to be aware about the need to apply exploration-specific metrics and techniques on exploratory innovation projects, they didn't seem to be applying them in practice, likely due to extant corporate culture and inertia. Instead, they may be applying the exploitative-appropriate approaches to a different extent on various types of project (see sections 5.7.6 and 5.8).

Karhu (2017) concluded that managers recognise the dualities involved in a given context and make decisions appropriately. This study offers a different view (see propositions 4 and 5). As discussed in section 2.5.4, Karhu's study was conducted in a different industry, and so it is unclear whether managers in her study operated in the same level of complexity (as per the Cynefin framework), as the managers in the high-tech industry this study is concerned with.

And so, while individual ambidexterity was clearly the focus of this research, the propositions (see section 5.8) have implications to both the project and firm level, answering a call by Raisch et al. (2009) to examine how individual factors impact ambidexterity at organizational level.

6.2.1.1. Implications for Leadership

With transformational leadership being a key antecedent in fostering ambidexterity in general and innovation in particular (see section 2.3.3), it is important to review the findings of the present research in light of the transformational leadership capabilities. As presented in

section 5.3.4, constructs that fall in categories most closely aligned with the transformational leadership competencies ('Clarity of objectives and outcomes', 'Clarity of vision', 'Organizational alignment', 'Motivation and empowerment', 'Strong leadership', and 'Executive sponsorship') have accounted together for less than 25% of all constructs, while the other categories relating to the planning, deciding, and resourcing functions of management were mentioned more frequently. However, when these issues were mentioned, they were seen as highly important, in Honey's sense. As presented in section 5.4.3.2, there was no difference between the extent to which the importance was given to these categories by the two different levels (tactical and strategic).

6.2.2. Managerial Sensemaking

Managerial cognitive activities such as perception and interpretation are key to an organisation's success (Ambrosini & Altintas, 2019; Wrona, Ladwig, & Gunnesch, 2013).

As discussed in section 2.5.3, people construct meaning differently because of their different backgrounds, interests and positions (Maitlis & Christianson, 2014) among other reasons. This study has shown (see section 5.4.4) that, with respect to project success, there are few differences between construing by managers from different levels; most differences in construing stem from different functions and from the type of experience managers have.

This study offers a slightly different angle to findings by Lisboa et al. (2011), who found that, while both customer and competitor market orientations are related to exploitative capabilities, as a firm tries to strengthen its position in the market, only the customer orientation is associated with the exploratory capability. Managers with both types of experiences in this study (see Table 22) gave similar importance to both customer focus and market focus.

Contrary to the author's expectations from the prior findings by Xu (2011), managers with more exploratory experiences did not exhibit higher cognitive complexity. This may be due to the fact that a parallel cannot be fully drawn between entrepreneurs (who were the focus of Xu's study) and managers with exploratory innovation experience (see section 5.4.5).

And so, this study contributes to the field of managerial sensemaking by exploring how managers at different levels (strategic vs. tactical), functions (Product Management vs. Engineering), and experiences (more exploratory vs. more exploitative) construe project

success in the context of ambidexterity, and in doing so extends and adds to the extant research. It should be noted that 'sensemaking' is being used as a more generic term, not specifically in Weickian terms.

6.2.3. Project Management, and a Modified Model

Davis (2014) invited researchers to explore how different stakeholder groups perceive success of projects. She indicated the focus of the extant literature on the role of Project Manager and advised to consider additional stakeholders in future research.

This study attempted to extend the findings of Pankratz & Basten (2014), who focused on construing of project success by Information Systems Project Managers in IT departments. This study resulted in richer findings by focusing on Product Management managers and Engineering managers, and by studying companies in the high-tech industry. Two major differences in results were observed:

1. Focusing on managers from the Product Management and Engineering functions has resulted in a much richer picture with respect to the categories, as compared to the Pankratz & Basten (2014) study. This study's 15 categories have very little overlap with categories resulting from their study. This finding also aligns with Mcleod & Macdonell (2010) who claimed that there is more to the definition of project success and failure than the 'iron triangle' of cost, schedule, and scope. They postulated that project outcomes may vary based on the perspectives of participants and are constructed based on participants' sensemaking.

2. The topic of project constraints has a fairly low proportion of 3.3%, being category number 12 out of 15 in the order of frequency. This is a major difference as compared to what Pankratz & Basten (2014) report, where the top two categories (that in essence comprise the 'Project Constrains' category in this study) account for 49.5% of all constructs. As mentioned above, this makes sense as their study focused on a different role in the organization. Additionally, their focus was on information systems development in an IT organization, which is a different business environment from an R&D organization in a software development company like Company A and Company B.

Additionally as discussed in section 2.4.2, and as presented in Figure 5 (see section 2.4.4) based on Baghai et al. (2000) and Moore (2015), exploratory innovation projects go through a lifecycle, where, as the time passes, they gradually move from exploration to exploitation, hereby requiring a change of techniques and metrics to be applied. Figure 10 below shows the expected behaviour vs. actual behaviour throughout the lifecycle of an exploratory project, by overlaying *Proposition 5* (see section 5.8) on the model represented in Figure 5 as the "actual behaviour".

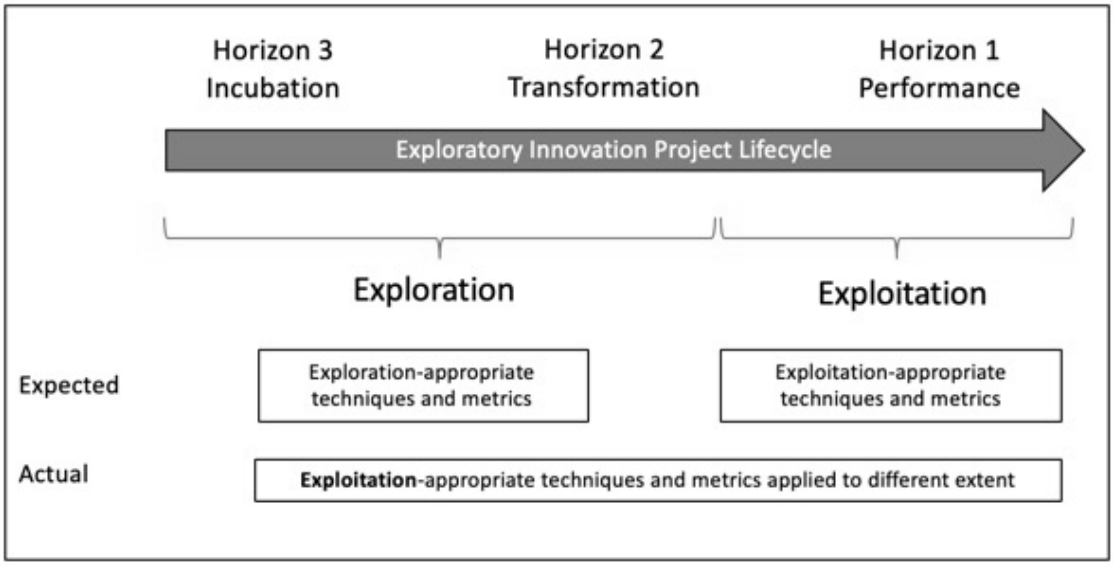


Figure 10. The Reality of Exploratory Innovation Project Lifecycle.
Source: Author.

This revision of the model presented in Figure 5 (see section 2.4.4) indicates a discrepancy between what is Expected and what is Actual. This discrepancy between the expected and actual behaviours will be discussed in section 6.3, where the model will be refined to address the discrepancy (see Figure 12, section 6.3.6).

6.2.4. Methodological Contribution

This study has contributed to research on individual ambidexterity using the RGT technique to explore how managers construe exploratory and exploitative projects – something that does not seem to have been done before. Repertory Grid Technique is well documented and offers several variations in how to apply it to a particular situation.

Remote elicitation

There seems to be little indication in the literature on application of RGT remotely by means of virtual conference (c.f. Magni, 2010). In the current research the present author was not able to meet with all respondents face to face; nevertheless, the elicited constructs were fairly specific and of high quality as compared with constructs elicited in-person (as validated in the Pilot study, see section 4.5.1). As discussed in section 3.4.1.2, the author used the GoToMeeting virtual conferencing software to conduct the RGT interview. However, unlike Magni (2010), the author did not capture the constructs directly into the grid analysis software. Instead, the data was captured in a single Microsoft Excel spreadsheet, to simplify the overall experience. Additionally, Magni (2010) reported the interviews to take about 30 minutes, while in this research both the in-person and remote interviews took on average about 50 minutes. And so, the present research contributes to the remote elicitation technique by adding to a scarce body of knowledge available on the subject.

This research has shown that RGT continues to be a viable approach in business and corporate context and offered an insight into less documented elicitation techniques.

6.3. Implications for Practice

Effective management of ambidexterity is an issue of high importance for incumbent organizations, especially in the Technology industry, because new entrants introduce their products to market continuously, and it is highly likely that the incumbents will get disrupted by the new entrants. Yet, true ambidexterity is hard to achieve.

It can be argued that Lean Startup techniques offer a more rigorous approach to the management of a new venture, whether in a corporate environment or a new startup, than the approaches that characterised the ‘dot-com era’ of 20 years ago. Approaches associated with Lean Startup have proven themselves well when applied rigorously and continue to be regarded as indispensable for exploratory innovation (Cagan, 2017).

With this in mind, the findings from this research suggest some issues of concern for project management practice in the two participating companies. If the managers are not evaluating each project to identify its type deliberately, and consequently not evaluating the right metrics

and techniques to be applied to drive it to a successful outcome, the consequences for the projects in question can be dire (see Cagan 2017; Baghai et al., 2000; Leifer et al., 2000; Teece, Peteraf, & Leih, 2016). As one informant put it:

> "*In most recent startup we pivoted couple times, and in retrospect we were clearly too slow to test hypotheses. Instead, we argued a lot. The startup died because we were too slow to find the product-market fit*." (ASEX-7)

While this reference was to the informant's prior startup experience, the same holds true for exploratory innovation projects in the corporate setting.

Several recommendations can be made to improve upon this situation. These recommendations are built on the literature review, six propositions arising from the grid interviews (see section 5.8), and specific suggestions made by key informants (see section 5.7.5.3).

6.3.1. Approaches to Change Management

Cummings & Worley (2008) evaluate several change models: the 'Levin's Planned Change Model', the 'Action Research Model', and the 'Positive Model', and develop what they call the 'General Model of Planned Change' that draws on the earlier mentioned three models. Figure 11 below shows the steps involved in this model.

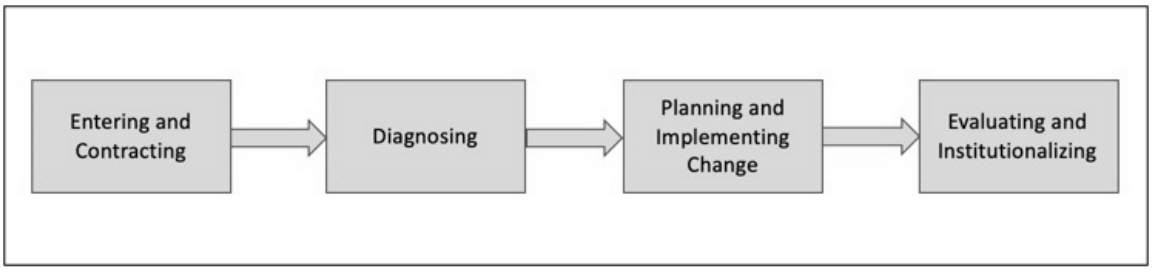


Figure 11. General Model of Planned Change.
Source: Cummings & Worley (2008, p. 30).

The last two stages ('Planning and Implementation' and 'Evaluating and Institutionalizing') are addressed in depth by the 'ADKAR' framework (Hiatt, 2006):

- **Awareness** "*represents a person's understanding of the nature of the change, why the change is being made and the risk of not changing*" (Hiatt, 2006, p.2).
- **Desire** "*represents the [personal] willingness to support and engage in a change*" (Hiatt, 2006, p.2).
- **Knowledge** "*represents the information, training and education necessary to know how to change*" (Hiatt, 2006, p.2).
- **Ability** "*represents the realization or execution of the change*" (Hiatt, 2006, p.2).
- **Reinforcement** "*represents those internal and external factors that sustain a change*" (Hiatt, 2006, p.3).

Managers in Company A are being proactively trained in the 'ADKAR' framework and it is sensible to assume that recommendations made in alignment with this framework will be easier to absorb, and map to how they already think about change.

Sections 6.3.2 through 6.3.4 offer recommendations in alignment with 'ADKAR', and section 6.3.5 discusses organizational design considerations in support of the change.

6.3.2. Awareness and Desire

First, organizations need to ensure that managers are aware of the issue and understand that neglecting to recognize the nature of the project and subsequently choosing an inappropriate approach may lead to sub-optimal outcomes. Chermack (2003) argues that not only should decision makers understand their mental models, they should also seek to alter them if those models are found inadequate for the situation at hand. Daft & Weick (1984) claim that managers should revisit their perceptions about the external environment that may not be as analysable as they may have assumed, and therefore they should seek to modify their approaches for the interpretation of that environment.

The revision of mental models is in line with Kelly's Personal Construct Theory (see section 2.5.5) which emphasizes that people act as scientists trying to understand the world around them, reviewing the lessons of experience (the 'Experience Corollary') in a search for improved effectiveness (the 'Choice Corollary'): see section 2.5.5.1.

This form of perceptual awareness and amendment can be achieved by awareness campaigns jointly led by senior Product Management and Engineering leaders. These leaders may need to attend a training or partner with one of the companies specialising in Lean Startup consulting.

6.3.2.1. Implications for Senior Managers

Senior managers should ensure that managers develop an intrinsic motivation to succeed (see Cummings & Worley, 2008), by developing an understanding of how they might best lead: that they can achieve success at work through recognition of exploratory projects and application of exploration-specific approaches on these projects. With leaders being propagators of change, an executive coaching strategy can be adopted for senior leaders in the organization to improve their ability to lead change, improve support for innovation, and develop ability to recognize different types of circumstances (see Dyson et al., 2019). Executive coaching was found to be an effective technique in leadership development (Kombarakaran et al., 2008), increasing the development of the managers (Rekalde et al., 2017; Thach, 2002) and more effective than other methods in sustaining change in managers' behaviour (Rekalde et al., 2017). In particular, executive coaching was found to have a significant impact on personal competencies of project managers' behaviour related to coping with uncertainty (Ballesteros-Sánchez et al., 2019), which can be related to uncertainty inherent in exploratory innovation. As was discussed in section 2.3.3.1, it is recommended for managers to adjust their leadership style if circumstances demand that, keeping in mind that such a change might prove a challenge to a manager.

6.3.3. Knowledge and Ability

Managers need to possess exploratory innovation competencies to succeed with radical innovation (see March, 1991; Raisch et al., 2009). Thornberry (2003) found that managers in corporations can be trained to act as entrepreneurs and drive new value creation for these companies. There are multiple ways to learn entrepreneurial approaches, and one of the best is – by doing (Byrne et al., 2016). Workshops, partnerships with incubators, and accelerators are different ways companies can get hands-on experience with the methodology (Innovation Leader, 2016). Dyson et al. (2019) indicate that for learnings to stick in the workplace, learnings need to be repeatedly applied in tasks of high significance.

Any knowledge training would have a higher chance to stick and see an application in practice in an organization that is supportive of change and incorporates Organizational Development (see Cummings & Worley, 2008) approaches (see section 6.3.5). Additionally, training that is tied to business goals has a higher likelihood to see implementation in the workplace (De Smet et al., 2012).

Byrne et al. (2016) describe a successful application of the 'Action Learning' approach (see Revans, 1998) to acquiring multi-disciplinary knowledge associated with entrepreneurship. They show evidence of participants' intent to become more self-aware, behave proactively in their organization, and laying the ground for knowledge exchange through networking (yet another skill acquired in training).

While the full-scale 'Action Learning' approach could be expensive (see Byrne et al., 2016), the basic provision of relevant knowledge components could be feasible in the form of a two-day workshop targeting around 25 participants at a cost of between $25,000 and $50,000 depending on provider and topic.

Investing in internal training has shown to lead to higher organizational effectiveness in terms of outcomes (Obi-Anike & Ekwe, 2014; Savery & Luks, 2004; Shah & Gupta, 2018) and higher effectiveness in employee innovative performance (see Sung & Choi, 2014).

For managers, the most important step in the process is to actually stop and think about the project, classify it as either exploitative or exploratory, and deliberately choose metrics and techniques appropriate for the situation. Incorrect classification of issues as simple in the context of Cynefin framework (see Kurtz & Snowden, 2003) is one of the dangers leaders face (Snowden & Boone, 2007). Moreover, it is key to continue and re-evaluate projects as they go through their lifecycle and move from exploration to exploitation (see Figures 5, 10, and 12).

Several recommendations made by informants (see section 5.7.5.3) are relevant in this context:

1. Call exploratory projects out explicitly (ASEX-7).
2. Tactical managers need to ask their managers (strategic managers) to hold them accountable to both financial and non-financial metrics (BSPX-11).

Leaders can use Moore's 'Zone-To-Win' framework, which offers concrete practical means of identifying projects belonging to each of the three horizons, and follow recommendations of Cagan (2017), McClure (2007), Owens & Fernandez (2014) , and Ries (2017) to identify the exploration-appropriate techniques (experimentation, proving desirability, feasibility, and viability of ideas) and metrics (customer and user traction metrics) to increase the chances of success with exploratory innovation projects (see sections 2.4.2.2 and 2.4.3.2). Figure 12 in section 6.3.6 will summarize this and other recommendations in a way of a model.

6.3.3.1. Implications for Learning

Organizational learning takes place at multiple levels: organizational, leadership, team, and individual level, and is shown to create a sustained advantage reflected in such outcomes as increase in financial and knowledge performance (see Reese & Hunter, 2016). In times of uncertainty, typically associated with exploratory innovation, middle managers have shown propensity to take on additional ownership and were motivated to learn (Reese & Hunter, 2016). Middle-managers mindset prior to attending a training program has shown to be a moderator of the type of change undertaken by them upon completion of training (Spreitzer & Quinn, 1996). Pulling on the transformational leadership theory, leaders possessing and exhibiting the 'Individualized consideration' capability (see section 2.3.3) such as coaching, are likely to see a positive impact on innovation outcomes (see Rouseau, 2012) and in that influence the organizational learning and outcomes. It's important to remember, that coaching requires leaders to acquire a 'coaching mindset' which needs to be a deliberate decision on a leader's part (Bianchi & Steele, 2014). The approach to coaching may need to be adjusted based on the context, such as the national culture (see Dodds & Grajfoner, 2018). While Cultural Values expressed at a national level were one of 3 superordinate themes, (the other two being 'Business Environment' and 'Approach and Methods)', organisational culture was seen as important, under the 'Business Environment' theme (Dodds & Grajfoner, 2018, p. 97).

6.3.4. Reinforcement

Companies might make use of assessment models and innovation capability maturity models (e.g Gatignon et al., 2002; Saunila & Ukko, 2012; Sun et al., 2012) to understand their current state of innovation capability and determine areas for improvement.

Frameworks like BSC (Decoene & Bruggeman, 2006; Ivanov & Avasilcăi, 2013; Kasie & Belay, 2013; Montgomery & Perry, 2011) were mentioned in section 2.3.4.4 in the context of addressing the agency issues. BSC is widely used by large companies and can be leveraged for introduction and enforcement of the right Key Performance Indicators (KPIs). Innovation projects thrive on trial and error, and experimentation and learning should be measured (McGrath, 2013). Muller et al., (2005) suggest tracking the number of ongoing experiments as one of the key metrics of a company's performance. Innovation Accounting (IA) should be introduced for projects identified as exploratory (Ries, 2017).

Additionally, companies may need to revisit their processes that have to do with the new product development lifecycle. Several recommendations were made by key informants in this regard (see section 5.7.5.3):

- Have a process for validating hypotheses and celebrate failures (ASPX-2).
- Introduce a clear process for exploratory innovation (ASEX-6).
- Improve the discovery and validation processes (ASEX-9).
- Introduce artificial constraints to resemble the startup environment (BSPX-12, ASPX-5).

Section 6.3.5 will discuss in more detail how Organizational Design approaches can help the change persist.

6.3.5. Organizational Design and Support

The suggestions outlined above rest on an Organizational Development (OD) approach (see Cummings & Worley, 2008), in which cultural change goes hand in hand with appropriate structural initiatives.

6.3.5.1. Culture

As was discussed in section 5.8, one of the antecedents of the issue at hand is the presence of a culture that fosters a focus on revenue-based metrics and undervalues the approaches of hypothesis-based experimentation. Many scholars argue for innovation and ambidexterity to become a deliberate strategy with supporting culture and structures (O'Reilly & Tushman,

2008; Pisano, 2015; Ries, 2017; Saleh & Wang, 1993); Autonomy and experimentation in particular are some key innovation capabilities corroborated by other authors (e.g. Cagan, 2017; Edison et al., 2018; Owens & Fernandez, 2014; Ries, 2017).

To be successful, companies will need to deliberately reassess the sets of metrics they use to track execution of exploratory projects (especially in the early phases of these projects) and balance the revenue-based with non-revenue-based metrics (see Cagan, 2017; Ries, 2017). Lean Startup approaches need to be promoted throughout. These, perhaps, are the hardest changes that the company needs to undergo to make their exploratory projects successful, and the complexity of implementing this recommendation should not be underestimated. As there seems to be an alignment between the 'Strategic' and 'Tactical' sub-groups on the topic of 'Methodologies', 'Customer Focus', and 'Market Focus' (see section 5.4.3.2), it is reasonable to suggest that once the awareness of Lean Startup approaches increases, the alignment can be achieved on this topic as well, since many of this method's considerations would map to these categories. Companies that will be successful at challenging their policies and confronting their basic assumptions will achieve what Argyris (1977) calls 'double-loop-learning' (see section 2.5.2). Figure 12 in section 6.3.6 will summarize this and other recommendations in a way of a model.

6.3.5.2. Structure

Case companies may need to go through what Covin & Miles (1999) call organisational rejuvenation – modifications an organisation applies to its structure, processes or capabilities to improve its competitive standing. Companies switching to ambidextrous designs saw more positive innovation outcomes (Tushman et al., 2010).

Several options are available to companies:

1. Separate exploratory projects into a deliberately created structure optimized for exploratory innovation. Naranjo-Valencia et al. (2011) have found that hierarchical cultures promote imitation, while adhocracies (cultures emphasizing grows, learning, and flexibility) promote innovation. Their findings are corroborated by Tian et al. (2018). O'Reilly & Tushman (2008) argue that separately aligned organisational architectures (business models, competencies, incentives, metrics, and cultures) for

exploration and exploitation subunits, and targeted integration increase the likelihood of ambidexterity.

2. Ries (2017) proposes for organisations to instantiate the entrepreneurial function to facilitate the exploration-specific approaches where appropriate throughout the company.

In the present author's opinion, the likelihood of instantiating the entrepreneurial function would be relatively low, as the idea is relatively new, and it is not a common practice in the industry the case companies operate in.

The act of separating exploratory innovation projects into a separate structure can be challenging if major changes that impact roles and reporting relationships are involved. However, separating teams working on exploratory innovation projects into a separate group with exploration-specific rules without making significant changes to the structure itself would be a relatively straightforward change. As an example, a company may have 10 teams working on a particular product. Once an exploratory project is pulled from the product backlog requiring 3 of these teams to implement it, the approach would be to call these 3 teams out and set expectations with them in terms of type of metrics to use, type of approaches to leverage, while providing the necessary training and support. At times, this may require shifting personnel between different teams, but should not require changing reporting.

6.3.5.3. Experience

As the findings indicate, experience is one of the leading indicators of differences in how managers think about project success. Moreover, experience with actual startups (not within the corporate walls), operating within real constraints of time and money, leads to a very different sensemaking process that managers learn from and take with themselves to the corporate world. Prior startup experience (especially one developed through multiple startups) leads to development of an entrepreneurial mindset (Burke et al., 2018; Dahl & Reichstein, 2007; Politis, 2008). Entrepreneurial experience results in development and subsequent use of entrepreneurial heuristics (Busenitz and Barney 1997).

Two recommendations can be made in that regard:

1. Augment the hiring strategy for management positions in the Product Management and Engineering functions with candidates with prior startup experience.
2. Hire 'Entrepreneur-in-Residence' (see George, 2010) – an executive with prior startup experience, who would help evaluate the projects, help classify them, and help the project teams and managers choose appropriate metrics and techniques.

One particular recommendation made by informants (see section 5.7.5.3) is relevant in this context:

- Bring "outside views" – people from outside of organization (BSEX-8).

Introduction of a change agent is considered to be one of the OD techniques (see Cummings & Worley, 2008). However, the question often arises whether to bring an external management consultant or a member of the top management team (see Ginsberg & Abrahamson, 1991). In fact, Ginsberg & Abrahamson (1991) found that external management consultants are more effective in influencing the executive mindset, rather than in driving a strategic change. It is sensible to offer a hybrid approach, where an external consultant is used in early stages of change management, followed by a change agent on staff, to continuously drive the strategic change.

6.3.6. Summary, and a Recommended Model

This section has discussed implications of findings for practice and offered multiple recommendations that companies A and B, and similar companies in similar circumstances could apply to improve chances of success of their exploratory projects. The author has built on recommendations offered by key informants, who hold senior positions in the participating companies, increasing the likelihood to receive support for the recommendations made in this section.

The 'ADKAR' change management framework was used as the basis for this chapter's outline, and OD principles were leveraged to indicate how the change can persist and succeed.

To summarize how the findings and recommendations made so far influence the managerial decision-making process in the context of ambidexterity, a conceptual model can be developed, building on Moore's 'Zone-to-Win' model (see section 2.4.2.1, 2.4.2.2), Argyris's

'Double-Loop Learning' (see sections 2.2.2.1, 2.5.2), the author's own model developed in section 2.4.4 (Figure 5), and the recommendations presented in section 6.3.

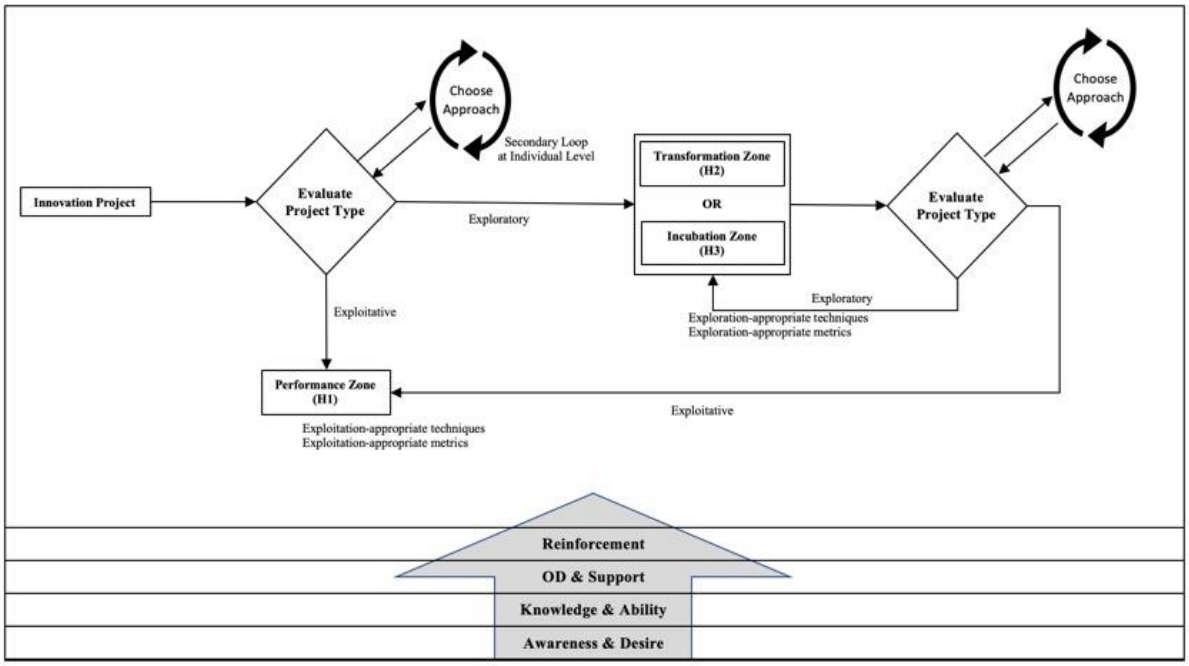


Figure 12. Recommended Model for Change
Source: Author.

In this model, a project is examined to determine the appropriate type (exploitative or exploratory). Once the evaluation is complete and the project is classified appropriately, a decision would be made about which of Moore's 'Zones' it belongs to, and appropriate techniques and metrics chosen to drive this project to a successful outcome. As discussed in section 2.4.2.1, Moore (2015) mapped the three horizons of innovation to four zones, three of them relevant to new products a company creates. In his model, Horizon 1 (H1) projects map to the 'Performance Zone' (core product and services contributing 10% or more to the bottom line); Horizon 2 (H2) maps to the 'Transformation Zone' (these projects are being accelerated to become Horizon 1 projects in near future); and Horizon 3 (H3) maps to the 'Incubation Zone' (where most early stage innovation projects are). Over time, the project needs to be re-evaluated, and if it is determined that it moved from exploration to exploitation –the approach would be adjusted.

It may be observed, that the flow described in the recommendation above resembles Kelly's 'CPC Decision Cycle' (see section 2.5.5.3), where Circumspection could be mapped to

recognition that the project at hand needs to be evaluated to determine a project type; Pre-emption to the decision on whether the project is exploratory or exploitative; and finally, Choice to a series of decisions about metrics and techniques to be applied to the project at hand. Of course, the recommendation discussed in this section goes beyond the construct-level CPC Decision Cycle and may lead to replacement of some of the previously existing constructs with fresh ones, as well as to a possible shift in values.

The recommended decision-making process described above would need to be supported by a company's organizational design, the leadership team's behaviours (see section 6.5.3.1), as well as management awareness, knowledge, and ability to make the appropriate choice of approaches, according to the recommendations made in sections 6.3.2 to 6.3.5.

6.3.6.1. Shaping Culture for Successful Change

Any major change in the management process will likely involve a culture change (see Schein, 2004). A company's culture is shaped by leaders' behaviour and the values, rules, and norms that are being communicated, fostered, and enacted (Schein, 2004). This is where the transformational leadership competencies, in particular those associated with 'idealized leadership', 'inspirational motivation', and 'intellectual stimulation' (see section 2.3.3) become critical in shaping the culture fostering behaviours associated with successful exploratory innovation. Additionally, leaders whose identity is more collective (as opposed to individual) may increase their effectiveness in shaping culture, when combined with exhibiting transformational behaviours (see Johnson et al., 2012).

6.3.7. Reflections: Some Immediate Implications for the Author's Practice

The tension between exploitation and exploration is not a mere theory, but a constant reality, which is also being experienced in the author's own practice. It often happens that a project with exploratory characteristics is treated as exploitative, with some unremarkable modifications: a greater emphasis on customer communication, and prototyping, for example. However, since no deliberate effort is being made to evaluate and classify these projects and choose the appropriate approaches and metrics accordingly, many aspects remain in an exploitative format, and at times the outcomes are suboptimal as a result.

Through RGT interviews with the managers from various levels and functions, the author learned not only how these managers think about project success, but why they think the way they do. It was somewhat positively surprising to hear that most managers do indeed recognize the value of Lean Startup techniques and realize the need to measure exploratory projects differently, and it was eye opening to realize that even though this knowledge exists to various degrees, the application of it in practice is not as straight forward as might be expected. This is where the author came to truly realize the power of RGT technique, which helps translate tacit knowledge into explicit knowledge – a result that would have been harder to achieve with a more traditional semi-structured interview.

Coincidentally, as the work on this thesis was coming to an end, the author's product development organization became involved in a new product investment. Armed with the knowledge gained from the thesis so far, the author was able to educate the various stakeholders in the Engineering and Product functions on the need to evaluate and classify the project, and then choose appropriate approaches and metrics that are very different from an exploitative project.

A more recent example is particularly interesting. A charismatic senior manager in the author's organization has recently reviewed some of the practices that we used to follow without regard to the fact that the company is changing from a traditional on-premises deployment model of our software to a cloud-based deployment. He emphasized that our approaches to date have not accounted for the fact that cloud software business has different characteristics and requires different approaches and metrics. His presentation and message have resonated well with the Engineering and Product Management teams, and his recommendations were immediately reflected on several projects, without any call to action on his part. This exemplifies the power of transformational leadership discussed in sections 2.3.3.1, 6.3.5.1, 6.3.6.1, and makes the current author more confident in the success of the recommendations made above.

6.4. Research Limitations

The case study method requires rigour to ensure validity and reliability of the research (Yin, 2017). Sections 3.3.2, 3.4.1, and 3.4.2 discuss how this research approaches the case study method, the Repertory Grid Technique (RGT) with its built-in reliability procedures, and the stage-2 triangulation technique to ensure rigour.

As discussed in sections 3.3.2 and 6.1, 'analytic generalisation' aims to generalise from the study to a variety of situations, in which shared theoretical assumptions apply. In the case of this study, the findings may be applicable to other established high-tech companies, especially in the Enterprise Software market who try to pursue ambidexterity whether as part of a deliberate or an emergent strategy (see Glossary).

Additionally, interview techniques have been criticized due to a possible researcher bias (Patton, 2002). Researcher bias was addressed in section 3.3.2, where the emphasis is given to the fact that RGT is known to address the researcher bias. Additionally, in the constructivist paradigm relying on PCT, a researcher's analysis is not given a privileged epistemological status with respect to the understanding displayed by the person being researched; both are engaged in sensemaking, and a positive value is attached to collaboration in this activity (see Denicolo et al., 2016). And finally, reliability checks (see sections 3.4.1.3, 5.3) were performed to make sure the categories of meaning were agreed upon between the researcher and a colleague.

Nevertheless, several limitations should be noted:

1. This research has focused on middle managers only. However, individual Product Managers, Architects, and Distinguished Engineers – all have major impact on vision, product roadmap, and tactical execution. Alignment with these individual contributors may also be interesting to explore, especially in context of the Agency theory.

2. While both participating companies were multi-national, the majority of the respondents (24 out of 25) where based in the US. A broader net could have been cast to include respondents from other regions. This would have also presented an opportunity for 'embedded multiple-case study' design (see Yin, 2017).

3. While the respondents provided six projects from their own experience, no information about these projects has been collected. Such information could have provided additional insight into the projects and could have provided an additional avenue for interpretation and triangulation. However, this might need a major and separate study given the complexity involved in such projects, with a design allowing, for example, a comparison of exploratory projects with more market uncertainty vs. exploratory projects with more technology uncertainty or a set of other characteristics.

4. This study assumed a matrixed organization typical for a Software company and didn't take into consideration whether respondents from the tactical level had any reporting relationship with any other respondents from the strategic level, especially since the focus of the study was on the question of alignment throughout the hierarchy.

6.5. Areas for Further Research

This case study research has helped identify patterns and themes in the way middle managers in two high-tech companies construe exploratory and exploitative projects. The generalizability of this study could be further improved by expanding the research to other geographies where these companies operate, and to other similar companies in the industry.

Additional areas of research could expand on and add to the findings of this research:

1. A similar research in smaller organizations: from early stage to late stage startups, and mid-size high-tech companies. This research would focus on cultural antecedents fostering or impeding the application of exploration specific metrics and techniques to exploratory innovation projects.
2. A longitudinal study of managers from Product Management and Engineering functions throughout an exploratory innovation project in a large high-tech company, to learn more details of their construing and decision making on a project at hand. This study could explore their construing as opposed to the enacted behaviours on projects.
3. As indicated in the previous section, individual contributors in the Product Management and Engineering functions drive many decisions in a high-tech company. A similar study of individual contributors in these functions could increase the generalizability of the findings.
4. In organizations where more formal reporting relationships are preserved on projects (as opposed to a matrix organization for project execution), it might be interesting to evaluate how managers in a given reporting structure construe exploratory and exploitative project success. Conversely, a further analysis of matrixed organizations may offer an insight to ambidexterity tensions stemming from employees identifying

themselves with different organizational structures (functional vs. project) at the same time (see Arvidsson, 2009).

5. A similar study could be conducted with a significant emphasis on characteristics of projects being discussed with the participants. Such information could provide an additional avenue for interpretation and triangulation and allow to compare these projects across various characteristics, such as:

    a. Exploratory projects with more market uncertainty vs. exploratory projects with more technology uncertainty;

    b. Exploratory projects aimed at introducing a new product vs. exploratory projects aimed at introducing an existing product to a new market;

    c. Projects that utilized appropriate techniques and metrics vs. projects that didn't;

    d. Projects that achieved stated outcomes vs. projects that didn't.

6. Several of the informants indicated that while there is an alignment in how managers throughout the hierarchy think about project success, it may not be what is happening in practice. Research on correlation between the alignment in how managers think vs. what is happening in reality could shed more light on the phenomenon.

7. One possible avenue for further research could be to explore how managers perceive their managers. For example, it might be interesting to explore whether the tactical managers' perceptions of the strategic managers match that of the strategic managers themselves, and what role do behaviours associated with transactional and transformational leadership styles play in shaping these perceptions.

8. An 'Action Research' method-based study (see Cummings & Worley, 2008; Ritchie et al., 2014) could usefully be undertaken to explore the impact of cultural change in general, and transformational leadership in particular, as the result of incorporating non-revenue-based metrics and embracement of the Lean Startup approaches.

6.6. Conclusion

This chapter has reviewed the findings of this research in light of the literature, and clarified contributions to theory and implications for business practice. Recommendations were made on how to approach the challenges surfaced by the findings, and a model of recommended behaviour was developed. Limitations of this research were discussed, and areas of further research were offered.

In conclusion, the author believes that for achieving success with exploratory innovation projects in the context of ambidexterity, clear distinction is required between the types of project a company undertakes, and appropriate techniques and metrics need to be tailored accordingly. This is only possible if managers are not only aware of the differences between the project types, but routinely recognize these differences, and deliberately apply the appropriate approaches. The pre-requisite is a culture that fosters such approach to exploratory innovation and does not enforce uniform behaviours irrespective of a project's type. The author is under no illusion that some of the changes proposed in section 6.3 may not be feasible for the case companies, or at least may require significant effort to implement. Yet, some other recommendations can be implemented gradually without significant effort or cost.

Appendices

Appendix 1 – Grid Examples

Appendix 1a – Pilot Study In-Person Interview Example

In this interview we will use a technique called Repertory Grid. With this technique, we will be capturing how you think about exploratory (novel) and exploitative (incremental) projects. These will be a series of opposites which are called constructs. Example: "more successful" vs. "less successful" is a construct. Our focus is on factors that make a project successful in terms of techniques and metrics associated with projects. Your confidentiality and privacy is guaranteed, and this grid will be coded for anonymity. This form will be sent back to you for review and signature to make sure you agree with the information captured.	Project A - Exploratory	Project B - Exploratory	Project C - Exploratory	Project D	Project E	Project F	Ideal Incremental Project	Ideal Exploratory Project	In what follows, I will be asking you to compare 3 projects at a time, and will ask you to tell me in what way are two of them are similar, and different from the third. You're thinking of particular projects now or in the past, at this company. Bear in mind that each project has it's own nuances, and that the business environment and circumstances vary, so that different constraints impact how you approach setting the project up for success. What sort if things happened with these projects, that made a difference between a successful and a less successful outcome? In your response please consider things like approach used to drive the project, or the way the project success was measured.
Emergent Pole	E1	E2	E3	E4	E5	E6	E9	E10	Implicit Pole
Overall, approaches used were more effective for project success	2	1	5	2	4	2	1	1	Overall, approaches used were less effective for project success
Business-minded value outcome	1	3	5	2	4	1	2	1	Technology in a search of a solution
Clear KPIs established at the outset	2	1	5	3	5	2	2	2	No clear KPIs established at the outset
Customer-driven input early in the project	1	1	3	2	4	3	3	1	Customer input/validation before shipping
Product managers not co-located with Engineering	4	5	1	3	5	4	4	4	Product managers co-located with engineering
Had no financial KPIs associated with outcomes	4	4	2	5	1	4	3	4	Clear financial metrics associated with outcomes
Strong Design & User Research teams collaboration	1	2	1	4	3	2	3	1	Little to no Design and User Research involvement
Design team deeply understands the problem space	1	1	3	2	4	2	3	1	Design team's involvement is limited to basic UI design
Rigorous backlog management with respect to prioritization and grooming	1	2	4	1	5	2	2	2	No rigorous backlog management process
Objective way to prioritize based on prioritization frameowrk like RICE	2	4	5	4	4	2	4	1	No clear prioritization framework
Clear executive sponsorship to protect resources	1	3	4	3	5	3	4	2	No clear executive sponsorship
Strong cross-company buy-in	1	3	3	1	4	2	3	2	Most teams were indifferent
Get to a shippable increment/MVP as soon as possibvle to have people experience the product	3	2	4	2	5	2	3	1	Wait too long to ship
Have empathy with personas you are trying to impact/serve	1	2	4	2	5	2	4	1	Not connecting with the persona you are trying to impact/serve

Appendix 1b – Pilot Study Remote Interview Example

In this interview we will use a technique called Repertory Grid. With this technique, we will be capturing how you think about exploratory (novel) and exploitative (incremental) projects. These will be a series of opposites which are called constructs. Example: "more successful" vs. "less successful" is a construct. Our focus is on factors that make a project successful in terms of techniques and metrics associated with projects. Your confidentiality and privacy is guaranteed, and this grid will be coded for anonymity. This form will be sent back to you for review to make sure you agree with the information captured.	Project A-Exploratory	Project B-Exploratory	Project C-Exploratory	Project D	Project E	Project F	Ideal Incremental Project	Ideal Exploratory Project	In what follows, I will be asking you to compare 3 projects at a time, and will ask you to tell me in what way are two of them are similar, and different from the third. You're thinking of particular projects now or in the past, at this company. Bear in mind that each project has it's own nuances, and that the business environment and circumstances vary, so that different constraints impact how you approach setting the project up for success. What sort if things happened with these projects, that made a difference between a successful and a less successful outcome? In your response please consider things like approach used to drive the project, or the way the project success was measured. Let's take projects X, Y, and Z. In what way two of them are alike in some way, and different from the third, in terms of what approaches make for effective management of these projects?
Emergent Pole	E1	E2	E3	E4	E5	E6	E9	E10	Implicit Pole
Overall, approaches used were MORE effective for project success	1	4	3	2	1	2	1	1	Overall, approaches used were LESS effective for project success
Was able to build a group from scratch	1	4	1	4	2	1	3	1	Inherited the group
No community engagement	1	1	2	2	1	5	5	5	Community driven product
Moving teams towards iterative development	5	1	2	1	2	5	2	1	Leaving the process alone
Had a strong executive commitment	1	4	2	1	1	1	1	1	Marginal executive support
Did not have a well defined leading indicators	3	1	2	4	5	2	5	5	Well defined leading indicators to project success (work burndown)
Good definition of done	1	3	3	1	1	2	1	1	No good definition of done
Really clear product definition	1	4	3	2	1	3	1	1	No clear product definition
Strong Product Manager engagement	2	3	4	2	1	4	1	1	No strong Product Management engagement
Dedicated Project Manager	5	1	5	1	4	5	1	1	No dedicated project Manager
Market was not ready for the product	5	3	5	2	5	5	5	3	Market was ready for the product

Appendix 1c – Low Cognitive Complexity Example (Respondent ATPI-3)

In this interview we will use a technique called Repertory Grid. With this technique, we will be capturing how you think about exploratory (novel) and exploitative (incremental) projects. These will be a series of opposites which are called constructs. Example: "more successful" vs. "less successful" is a construct. Our focus is on factors that make a project successful in terms of techniques and metrics associated with projects. Your confidentiality and privacy is guaranteed, and this grid will be coded for anonymity. This form will be sent back to you for review and signature to make sure you agree with the information captured.	Project A - Exploratory	Project B - Exploratory	Project C - Exploratory	Project D	Project E	Project F	Ideal Incremental Project	Ideal Exploratory Project	In what follows, I will be asking you to compare 3 projects at a time, and will ask you to tell me in what way are two of them are similar, and different from the third. You're thinking of particular projects now or in the past, at this company. Bear in mind that each project has it's own nuances, and that the business environment and circumstances vary, so that different constraints impact how you approach setting the project up for success. What sort if things happened with these projects, that made a difference between a successful and a less successful outcome? In your response please consider things like approach used to drive the project, or the way the project success was measured. Let's take projects X, Y, and Z. In what way two of them are alike in some way, and different from the third, in terms of what approaches make for effective management of these projects?
ELICIT CONSTRUCTS	E1	E2	E3	E4	E5	E6	E9	E10	RATE CONSTRUCT BY CONSTRUCT
Overall, approaches used were more effective for project success	2	5	5	3	3	1	1	1	Overall, approaches used were less effective for project success
No telemetry to measure usage	3	1	1	4	4	5	5	5	Good usge telemetry
No visibility into customer behavior	3	1	1	4	4	4	5	5	Full awareness of behavior and experience patterns
Had a clear business case	3	4	4	2	2	5	5	5	No business case defined
Well funded with resources	2	5	5	4	3	1	2	1	Not well funded
Customer driven	1	1	2	2	2	5	1	2	Internal push by company strategy / execs
Agile development process	4	5	5	3	2	1	1	1	Waterfall development process
Co-located Engineering teams	1	1	1	1	1	3	3	1	Distributed Engineering teams
High focus on revenue and sales	3	5	5	3	2	1	2	1	Low focus on revenue or sales
Team was motivated & engaged	2	5	5	3	2	1	2	1	Team was not motivated or engaged
Had a business model defined ahead of project start	2	4	5	5	5	2	2	1	Did not have a business model defined
Aligned with the company's strategy	4	5	5	3	2	1	2	1	Did not align with company's strategy
Understood the various personas (buyer, user)	2	2	2	4	3	1	1	1	Made assumptions about personas
Had a growth mindset	1	5	5	3	4	1	2	1	Had a content mindset
Sales teams were incentivised to sell	3	5	5	3	3	4	3	1	Sales teams were not incentivised to sell

Appendix 1d –High Cognitive Complexity Example (Respondent BSPX-11)

In this interview we will use a technique called Repertory Grid. With this technique, we will be capturing how you think about exploratory (novel) and exploitative (incremental) projects. These will be a series of opposites which are called constructs. Example: "more successful" vs. "less successful" is a construct. Our focus is on factors that make a project successful in terms of techniques and metrics associated with projects. Your confidentiality and privacy is guaranteed, and this grid will be coded for anonymity. This form will be sent back to you for review and signature to make sure you agree with the information captured.	Project A - E	Project B - E	Project C - E	Project D - I	Project E - I	Project F - I	Ideal Incremental Project	Ideal Exploratory Project	In what follows, I will be asking you to compare 3 projects at a time, and will ask you to tell me in what way are two of them are similar, and different from the third. You're thinking of particular projects now or in the past, at this company. Bear in mind that each project has it's own nuances, and that the business environment and circumstances vary, so that different constraints impact how you approach setting the project up for success. What sort if things happened with these projects, that made a difference between a successful and a less successful outcome? In your response please consider things like approach used to drive the project, or the way the project success was measured. _____ Let's take projects X, Y, and Z. In what way two of them are alike in some way, and different from the third, in terms of what approaches make for effective management of these projects?
ELICIT CONSTRUCTS	E1	E2	E3	E4	E5	E6	E7	E8	RATE CONSTRUCT BY CONSTRUCT
Overall, approaches used were MORE effective for project success	3	2	1	3	2	3	1	1	Overall, approaches used were LESS effective for project success
Had several intended outcomes	1	3	5	4	4	3	5	3	Had one specific outcome
Required market understanding	1	1	5	1	2	4	4	1	Required technical understanding
Fell into a single product line in terms of teams working on it	1	1	3	3	2	1	1	3	Fell into multiple producft lines
Had to focus on customers	3	4	5	4	2	1	3	3	Had many internal stakeholders
Followed Agile methodology	1	4	1	5	3	1	1	1	No meaningful methodology followed
Required exec sponsorship	4	1	1	3	3	5	5	1	Did not require exec sponsorship
Required infrastructure changes	1	4	2	5	3	1	5	3	Did not require infrastructure changes
Required UX design	5	5	1	3	5	1	2	4	Did not require UX design
Driven by customer requirements	4	1	5	2	1	3	1	3	Driven by product leadership
Was a relatively small team	3	2	1	3	4	2	1	1	Required a large team
Clearly defined outcomes	4	3	2	1	2	4	1	3	Unclear outcomes
Well defined responsibilities for each member of the team	2	4	1	3	2	3	1	1	Responsibilities loosly deffined or undefined
A well defined system that everyone is using regardless of a particular methodology	1	4	1	3	2	5	1	3	No well defined system to follow
Dedicated resources	2	5	1	2	1	3	2	4	No dedicated resources - split attention (allocating 25% to one thing and 25% to another)
Dependencies and contingincies were not fully understood in advance	2	3	5	4	4	1	5	3	Dependencies and contingincies were fully understood in advance

Appendix 2 – Pilot Study Content Analysis

Category	Constructs
Lean Startup Approaches	ASP2-12- Get to a shippable increment/MVP as soon as possible to have people experience the product – Wait too long to ship; ASP2-3- Customer driven input early in the project – Customer input/validation before shipping; ASP2-13- Have empathy with personas you are trying to impact/serve – Not connecting with the persona you are trying to impact/serve; BTER2-9- One way feedback from customer on a quarter delay – Fast feedback loop responding to customer; BSE1-2- No community engagement – Community driven product; ASP2-7- Design team deeply understands the problem space – Design team's involvement is limited to basic UI design; ATE1-5- Development relied on data (telemetry) – No data available to help make decisions; ASP2-1- Business-minded value outcome – Technology in search of a solution; BSE1-10- Market was not ready for the product – Market was ready for the market
Agile Approaches	ATE1-1- Agile spikes were needed to reduce uncertainty – Spikes were not needed as there was less uncertainty; ATE1-6- Followed Agile practices more closely – Did not follow Agile practices (more disorganized); ATE1-11- Followed good practices for quality controls (unit testing, automation) – Quality control was an afterthought; ASP2-8- Rigorous backlog management with respect to prioritization and grooming – No rigorous backlog management process; ASP2-9- Objective way to prioritize based on prioritization framework like RICE – No clear prioritization framework; BSE1-3- Moving teams towards iterative development – Leaving the process alone; BSE1-6- Good definition of done – No good definition of done; BSE1-8- Strong Product Manager engagement – No strong Product Management engagement
Operational Focus	BTE2-3- Minimize time and effort spent – Achieve feature milestones; BTE2-5- Assigned to the team – Assigned to me; BTE2-4- Improving quality and usability, minimizing defects and Supports escalations – Optimizing ongoing operations; BTE2-1- Assigned smaller more concreate coding tasks – More elaborate project management and overall project strategy; BTE2-11- Coarse grained tracking (Epics, stories) with road-mapping tools like Aha!; ATE1-8- Unpredictable release cadence (frequency) – More predictable release cadence;

	BTE2-8- Customer expectation is for issues and new features to be addressed on a quarterly cadence – Customer's expectation is for ongoing delivery of fixes and new features (SaaS)
Tracking Success	ASP2-2- Clear KPIs established at the outset – No clear KPIs established at the outset; ASP2-5- Had no financial KPIs associated with outcomes – Clear financial metrics associated with outcomes; BSE1-5- Did not have well defined leading indicators – Well defined leading indicators to project success 9work burndown); BTE2-7- Easily trackable metrics (bug reports) – Have not been able to define good metrics yet; BTE2-6- Had deadlines – Did not have deadlines; BTE2-10- Starting out with well-defined milestones – Starting out with no or ill-defined milestones
Resourcing	ATE1-3- Shared Resources – Dedicated resources; ATE1-7- Dedicated Product Owner with regular engagement – Less PO guidance; ATE1-10- Dedicated Scrum Master – No dedicated Scrum Master; BSE1-9- Dedicated Project Manager – No dedicated Project Manager
Executive Sponsorship	ASP2-10- Clear executive sponsorship to protect resources – No clear executive sponsorship; BSE1-4- Had strong executive commitment – Marginal executive support; ASP2-11- Strong cross-company buy-in – Most teams were indifferent
Collaboration	BTE2-2- Cross Team collaboration and coordination – Personnel management within a single team; ASP2-6- Strong Design & User Research teams' collaboration – Little to no Design and User Research involvement; BTE2-12- Authority is required to direct the team – Influence other teams
Team Location	ATE1-2- Co-location led to smoother planning and execution – Lack of co-location led to more coordination and planning; ASP2-4- Product managers not co-located with engineering – Product managers co-located with engineering
Project Uncertainty	ATE1-4- Vision of how to achieve the end result was clear – Vision of ow to achieve the end result was ambiguous; BSE1-7- Really clear product definition – No clear product definition
Team Structure	ATE1-9- Teams were sized appropriately for easier communication and coordination – Teams were not sized appropriately leading to less efficient communication and coordination; BSE1-1- Was able to build a group from scratch – Inherited the group

Appendix 3 – Makeup of sub-groups and Frequency of Constructs

		Company A		Company B		Total	
		Participants	Constructs	Participants	Constructs	Participants	Constructs
Total		**13** **52.0%**	**166** **54.1%**	**12** **48.0%**	**141** **45.9%**	**25** **100%**	**307** **100%**
Strategic	**VP**	5	69	1	10	6	79
	Sr. Director	2	25	4	49	6	74
	Total Strategic	**7** **28.0%**	**94** **30.6%**	**5** **20.0%**	**59** **19.2%**	**12** **48.0%**	**153** **49.8%**
Tactical	**Director**	4	47	6	70	10	117
	Sr. Manager	1	14	0	0	1	14
	Manager	1	11	1	12	2	23
	Total Tactical	**6** **24.0%**	**72** **23.5%**	**7** **28.0%**	**82** **26.7%**	**13** **52.0%**	**154** **50.2%**
Product Management	**Strategic**	4	52	3	37	7	89
	Tactical	3	39	2	20	5	59
	Total Product	**7** **28.0%**	**91** **29.6%**	**5** **20.0%**	**57** **18.6%**	**12** **48.0%**	**148** **48.2%**
Engineering	**Strategic**	3	42	2	22	5	64
	Tactical	3	33	5	62	8	95
	Total Engineering	**6** **24.0%**	**75** **24.4%**	**7** **28.0%**	**84** **27.4%**	**13** **52.0%**	**159** **51.8%**
Experienced more with	**Exploratory projects**	7 28.0%	89 29.0%	9 36.0%	107 34.9%	16 64.0%	196 63.8%
	Exploitative projects	6 24.0%	77 25.1%	3 12.0%	34 11.1%	9 36.0%	111 36.2%
Data Collection Approach	**In Person**	11 44.0%	143 46.6%	3 12.0%	36 11.7%	14 56.0%	179 58.3%
	Remote	2 8.0%	23 7.5%	9 36.0%	105 34.2%	11 44.0%	128 41.7%

Appendix 4 – Constructs by Respondents

This appendix presents all 307 constructs grouped by and sorted by respondents.

Construct ID is coded according to the following key:

[*Company* A|B][*Level* Strategic=S |Tactical=T][*Function* Product Management=P|Engineering=E][*Experience* Exploratory=X|Exploitative=I][interviewee number within a company]-[construct number for an interviewee]

For example, ATPI3-4 means: Company A, Tactical, Product Management, Experience with Exploitative projects, 3rd interviewee from the Company A, construct number 4.

%SIM stands for Similarity Score, as described in section 3.4.1.3.

H-I-L stands for High, Intermediate, Low score calculated as part of Honey's Analysis, as described in section 3.4.1.3.

Emergent Pole is the first part of the construct elicited, indicating in what way two projects I a triad were similar.

Implicit Pole is the second (contrasting aspect) of the construct elicited, indicating in what way the third project in a triad was different.

Ideal Exploitative and **Ideal Exploratory** projects are the two supplied elements as described in section 3.4.1.2.

Construct ID	Emergent Pole	Implicit Pole	% SIM	H-I-L	Ideal Exploratory	Ideal Exploitative
ASEI8-1	Used modern development practices	Used old school development practices	84.4%	H	1	1
ASEI8-10	An imposed deadline	A negotiated deadline	78.1%	I	5	5
ASEI8-11	Teams were co-located	Teams were geo-distributed	81.3%	I	1	1
ASEI8-12	Non-negotiable operating principles known to all	Did not have clear operating principles	87.5%	H	1	1
ASEI8-13	Success criteria was known to all	Success criteria was not clear	84.4%	H	1	1
ASEI8-14	Risks were visible and transparent	Risks were not visible	87.5%	H	1	1
ASEI8-15	Project planning was a community exercise	Project planning was not jointly done	87.5%	H	1	1
ASEI8-16	The "why" was clear	The "why" was not clear	78.1%	I	1	1
ASEI8-2	Iterated on requirements	Set requirements ahead of time (requirements locked)	81.3%	I	1	2
ASEI8-3	Closely collaborated with product design	Design was an afterthought	78.1%	I	1	2
ASEI8-4	Had data to make data-driven decisions	Did not have data for making decisions	81.3%	I	2	1
ASEI8-5	Were willing to make changes based on data	Unwilling to make changes based on data	93.8%	H	2	1
ASEI8-6	Cross-team coordination for delivery	Work was self-contained in a single team	81.3%	I	5	5
ASEI8-7	Tactical need, driven by Sales team	Strategic, driven by product leadership	68.8%	L	5	3
ASEI8-8	Product had a clear customer value	Enabler feature / capability	65.6%	L	3	2
ASEI8-9	Success defined by mere delivery of a feature	Success defined with KPIs beyond delivery of a feature	81.3%	I	5	5
ASEX6-1	A combination of Hardware and Software	Hardware only or Software only	71.9%	I	5	5
ASEX6-10	Customer partnership and commitment from day 0 (customer got stock)	Solution developed in-house then looked for a market	84.4%	H	1	3
ASEX6-11	A well-defined methodology agreed upon across teams	Each team had their own methodology	81.3%	H	1	1

ASEX6-12	Early prototypes, mock-ups, demonstrable product	Big Bang delivery	78.1%	I	1	1
ASEX6-13	Heavy reliance on automated verification	Manual testing	81.3%	H	1	3
ASEX6-2	Small and highly qualified self-directed team	Ad-hoc team, more junior, less domain knowledge	90.6%	H	1	3
ASEX6-3	A clear vision about what market we are going after	Less clarity about target market	78.1%	I	3	1
ASEX6-4	Driven by a passionate engineer	PM driven requirements without clear purpose	81.3%	H	1	3
ASEX6-5	Rigorous development methodology to deal with cutting edge technology	Managing technological evolution, a derivative of existing technology	56.3%	L	2	5
ASEX6-6	Follow the open-source practices, constrained by existing technology	Proprietary technology- had full freedom to innovate	59.4%	L	3	5
ASEX6-7	Heavy experimentation & technology investigation	Less experimentation due to higher certainty	62.5%	L	3	5
ASEX6-8	Managing 3rd parties	All in-house, full control	62.5%	L	3	5
ASEX6-9	Everyone on the team had team-level incentive (fail or succeed together)	Individual level incentives and consequences	62.5%	L	3	5
ASEX7-1	A small visionary team	An army of engineers and managers	78.1%	H	1	4
ASEX7-10	Had team efficiency/productivity metrics in place	Team productivity was not measured	81.3%	H	5	1
ASEX7-11	Had flexibility in direction	The direction was set in stone	68.8%	I	1	3
ASEX7-12	Had exceptional performers on the team	Had average performers on the team	84.4%	H	1	3
ASEX7-13	Frequent cadence of customer facing releases	Big Bang releases	68.8%	I	2	1
ASEX7-2	Projects had a realistic deadline	The deadline was not realistic	75.0%	H	4	1
ASEX7-3	Had a benevolent dictator at the helm	Had a committee in charge	75.0%	H	2	4
ASEX7-4	Had a big legacy market to deal with	Started fresh with a new customer base	56.3%	L	5	2
ASEX7-5	Risk tolerance was high	Risk tolerance was low	68.8%	I	1	4

ASEX7-6	Fully expected to build entirely in house	Fully expected to buy technology or product	84.4%	H	3	1
ASEX7-7	Highly resource constrained	High budget available	71.9%	I	4	4
ASEX7-8	Internally facing product	Externally facing product	53.1%	L	5	5
ASEX7-9	In person customer discovery	Aggregate customer data	75.0%	H	1	4
ASPX10-1	Co-located resources	Distributed resources	81.3%	L	1	1
ASPX10-10	Had true believers, champions (SEs, Sales) in the field	No interest from the field	78.1%	L	1	1
ASPX10-11	Ability to measure success (DAU) in terms of having the right metrics, and data	Not being able to measure success	78.1%	L	1	1
ASPX10-12	Ability to leverage the organization in terms of drawing attention from outside the product team, and show what's in it for them	Inability to leverage the organization outside of the product team	90.6%	H	1	2
ASPX10-2	More rigorous project management with meetings, milestones, and action items	Less rigorous, more unstructured project management	96.9%	H	1	2
ASPX10-3	Involved prototyping (POC) to reduce feasibility risk	Prototyping was not required as risk was low	84.4%	I	1	2
ASPX10-4	Strong Engineering management	Lack of strong Eng management	87.5%	I	1	2
ASPX10-5	Had a strong stakeholder buy-in	Did not have a strong stakeholder buy-in	81.3%	L	1	1
ASPX10-6	Had clear goals, objectives	Did not have clear goals and objectives	87.5%	I	1	1
ASPX10-7	The "why" was clearly articulated	The "why" was not clear	87.5%	I	1	1
ASPX10-8	The team was very motivated	The team was not highly motivated	87.5%	I	1	2
ASPX10-9	Had a clear customer demand for the new capability	Driven by internal vision	75.0%	L	2	2
ASPX2-1	Business-minded value outcome	Technology in a search of a solution	84.4%	H	1	2
ASPX2-10	Clear executive sponsorship to protect resources	No clear executive sponsorship	65.6%	L	2	4
ASPX2-11	Strong cross-company buy-in	Most teams were indifferent	71.9%	L	2	3

ASPX2-12	Get to a shippable increment/MVP as soon as possible to have people experience the product	Wait too long to ship	81.3%	H	1	3
ASPX2-13	Have empathy with personas you are trying to impact/serve	Not connecting with the persona you are trying to impact/serve	78.1%	I	1	4
ASPX2-2	Clear KPIs established at the outset	No clear KPIs established at the outset	87.5%	H	2	2
ASPX2-3	Customer-driven input early in the project	Customer input/validation before shipping	81.3%	H	1	3
ASPX2-4	Product managers not co-located with Engineering	Product managers co-located with engineering	81.3%	H	4	4
ASPX2-5	Had no financial KPIs associated with outcomes	Clear financial metrics associated with outcomes	78.1%	I	4	3
ASPX2-6	Strong Design & User Research teams collaboration	Little to no Design and User Research involvement	65.6%	L	1	3
ASPX2-7	Design team deeply understands the problem space	Design team's involvement is limited to basic UI design	84.4%	H	1	3
ASPX2-8	Rigorous backlog management with respect to prioritization and grooming	No rigorous backlog management process	78.1%	I	2	2
ASPX2-9	Objective way to prioritize based on prioritization framework like RICE	No clear prioritization framework	75.0%	I	1	4
ASPX5-1	Feasibility had a high risk	Tech feasibility was a low risk	75.0%	I	3	4
ASPX5-10	Project coordination was more complex	Project coordination was less complex	84.4%	H	5	5
ASPX5-11	Vision, requirements, target audience were clear	Vision, requirements, target audience were NOT clear	81.3%	H	2	1
ASPX5-12	Had a measurable success criteria	Did not have success criteria	75.0%	I	2	3
ASPX5-13	Stakeholders (Engineering, Product, Design) were on the same page	Stakeholders were not aligned	84.4%	H	2	1
ASPX5-14	Had a clear understanding of dependencies	Did not have a good grasp of dependencies	87.5%	H	2	1
ASPX5-15	Had a clear understanding of risk	Risks were not clearly identified	87.5%	H	2	1
ASPX5-16	Iterative development approach	Waterfall-like approach	81.3%	H	2	1
ASPX5-2	Driven by customer feedback	driven by internal vision of product leaders	71.9%	I	3	2

ASPX5-3	Feedback is coming directly from a proxy user	Feedback is coming from the actual user	71.9%	I	2	2
ASPX5-4	Invest based on success	Upfront capital investment	78.1%	I	2	1
ASPX5-5	Solution paradigm completely novel	Similar solutions paradigms exist in adjacent market	68.8%	L	2	4
ASPX5-6	Design paradigm was developed ground up	Design was influenced by existing paradigms	62.5%	L	2	3
ASPX5-7	More rigorous in defining and tracking KPIs	Less rigorous in defining and tracking KPIs	84.4%	H	2	3
ASPX5-8	Metrics that quantify benefits to the customer (ROI, cost)	Metrics that indicate benefits (Active Use)	75.0%	I	1	3
ASPX5-9	Release process more rigorous	Release process less rigorous	68.8%	L	5	3
ASPX9-1	Dependencies were self-contained	Dependencies were not managed properly	81.3%	H	1	1
ASPX9-10	Consistency of vision and goals	Frequent change in vision and goals, no clarity	87.5%	H	1	3
ASPX9-11	Shorter, more frequent value delivery	Long-running project, delayed value delivery	78.1%	H	3	2
ASPX9-2	Multi-staged overengineered discovery	Lean, prototype-driven discovery	81.3%	H	5	4
ASPX9-3	Redefining the market	Following the market	59.4%	L	1	4
ASPX9-4	Customer requests drive requirements	Solutions-centric definition of requirements	71.9%	I	5	3
ASPX9-5	Waterfall-like approaches	Agile transformation happened during the project	87.5%	H	5	5
ASPX9-6	Follow existing Go To Market motion	Changing the Go To Market Approach	68.8%	I	3	1
ASPX9-7	Risk-driven planning	Schedule-driven planning	62.5%	L	1	4
ASPX9-8	Traditional app development (static)	Declarative application building	65.6%	L	4	3
ASPX9-9	Stakeholders were aligned	Stakeholders were not aligned	78.1%	H	1	3
ATEI12-1	High degree of focus, small co-located team	Globally distributed team, personnel issues, communications overhead	84.4%	H	1	1
ATEI12-10	Well-funded with resources	Not well funded with resources	65.6%	L	4	2

ATEI12-11	Success measured as an impact on the target market	No significant impact on target market	84.4%	H	2	2
ATEI12-2	Managed with Agile methodology	Managed in Waterfall manner	65.6%	L	1	2
ATEI12-3	Hard ship-date	Flexibility in ship date	68.8%	L	3	4
ATEI12-4	Fixed scope, non-negotiable	Flexibility in scope, in terms of ability to move items in and out of scope throughout development	68.8%	L	4	2
ATEI12-5	Focused on external customers	Focused on internal company customers	62.5%	L	3	3
ATEI12-6	Sales driven, targeted on opportunity	Greenfield development through customer discovery	75.0%	I	5	2
ATEI12-7	Solution that addresses a market need	Solution has no target market, done for the sake of being done	68.8%	L	3	1
ATEI12-8	Right skills set, right individuals	Dysfunctional product team (cross-business delivery team)	71.9%	I	3	2
ATEI12-9	Right scope identified given the market conditions (MVP)	Scope is not matched to market conditions or vice versa	78.1%	H	3	2
ATEI13-1	Teams were organized around technology components	A full stack feature team	75.0%	I	5	4
ATEI13-10	Had health of product metrics (e.g. availability) in place	Did not have health of product metrics in place	78.1%	I	3	1
ATEI13-11	Came as a ground up initiative from the team	Driven by management / execs	75.0%	I	4	2
ATEI13-2	Had a well-defined objective, business value, scope	Did not have a well-defined objective, business value, scope	71.9%	I	3	5
ATEI13-3	Team had expertise in technology required in the project	Team needed ramp up on technology required	59.4%	L	3	1
ATEI13-4	Single phase, small scope	Phased approach to delivery because the scope was large	81.3%	I	5	5
ATEI13-5	Frequent customer feedback throughout development	Customer feedback after launch	65.6%	L	1	5
ATEI13-6	Had multiple and frequent internal milestones	A big-bang delivery	93.8%	H	1	1
ATEI13-7	Overhead of dependency management	Self-sufficient, all done within the team	84.4%	H	5	5

ATEI13-8	High degree of UI Design team involvement	Minimal input from UI Design team	75.0%	I	1	1
ATEI13-9	Had adoption tracking implemented as part of product development	No adoption tracking implemented	81.3%	I	1	1
ATEX1-1	Agile spikes were needed to reduce uncertainty	Spikes were not needed as there was less uncertainty	75.0%	L	2	3
ATEX1-10	Dedicated Scrum Master	No dedicated Scrum Master	87.5%	H	1	2
ATEX1-11	Followed good practices for quality controls (unit testing, automation)	Quality control was an afterthought	81.3%	I	1	1
ATEX1-2	Co-location led to smoother planning and execution	Lack of co-location led to more coordination and planning	81.3%	I	1	1
ATEX1-3	Shared Resources	Dedicated resources	81.3%	I	4	4
ATEX1-4	Vision of how to achieve the end result was clear	Vision of how to achieve the end result was ambiguous	78.1%	L	2	2
ATEX1-5	Development relied on data (telemetry)	No data available to help make decisions	87.5%	H	1	1
ATEX1-6	Followed Agile practices more closely	Did not follow Agile practices (more disorganized)	90.6%	H	1	1
ATEX1-7	Dedicated Product Owner with regular engagement	Less PO guidance	87.5%	H	1	2
ATEX1-8	Unpredictable release cadence (frequency)	More predictable release cadence	87.5%	H	4	5
ATEX1-9	Teams sized appropriately for easier communication and coordination	Teams not sized appropriately leading to less efficient communication and coordination	75.0%	L	1	1
ATPI11-1	Driven by customer need through direct customer interaction	Top-down approach driven by the leadership team	65.6%	I	1	2
ATPI11-10	Alignment across various functions in the company	Siloed functions, no alignment across company	78.1%	H	1	1
ATPI11-11	Predictable delivery based on past performance	Imposed deadlines	78.1%	H	1	1
ATPI11-12	Empower teams to build solutions based on a clearly articulated "Why"	Spelled out requirements and top-down project plans	75.0%	H	1	1

ATPI11-13	Solution was designed cross-functionally (Eng, Design)	Solution was designed without collaboration by a single function	75.0%	H	1	1
ATPI11-14	Short iterations with incremental delivery	Big Bang releases	81.3%	H	1	1
ATPI11-2	Based on the need to solve an architectural problem	Based on a clear user need	56.3%	L	5	3
ATPI11-3	Small cross-functional teams were formed to explore	Existing teams executed	59.4%	L	1	5
ATPI11-4	Active discovery with customers	Forced change based on business need	65.6%	I	1	2
ATPI11-5	Significant number of interviews to address major unknowns	Small number of interviews to validate some assumptions with some unknowns	62.5%	L	1	3
ATPI11-6	Data driven during Beta and after release to track adoption	Not able to collect data for adoption tracking	71.9%	I	1	1
ATPI11-7	High revenue goals for the first year after release	No revenue goals attached	68.8%	I	5	3
ATPI11-8	Traditional metrics like revenue and active use were used to track success	User engagement and user behaviour metrics were used to track success	71.9%	I	5	3
ATPI11-9	Beta approach to get feedback and improve the offering	Gradual release rollout to control for risk and quality	68.8%	I	1	3
ATPI3-1	No telemetry to measure usage	Good usage telemetry	90.6%	H	5	5
ATPI3-10	Had a business model defined ahead of project start	Did not have a business model defined	78.1%	I	1	2
ATPI3-11	Aligned with the company's strategy	Did not align with company's strategy	87.5%	H	1	2
ATPI3-12	Understood the various personas (buyer, user)	Made assumptions about personas	78.1%	I	1	1
ATPI3-13	Had a growth mindset	Had a content mindset	90.6%	H	1	2
ATPI3-14	Sales teams were incentivized to sell	Sales teams were not incentivized to sell	81.3%	H	1	3
ATPI3-2	No visibility into customer behaviour	Full awareness of behaviour and experience patterns	87.5%	H	5	5
ATPI3-3	Had a clear business case	No business case defined	71.9%	I	5	5
ATPI3-4	Well-funded with resources	Not well funded	93.8%	H	1	2

ATPI3-5	Customer driven	Internal push by company strategy / execs	59.4%	L	2	1
ATPI3-6	Agile development process	Waterfall development process	90.6%	H	1	1
ATPI3-7	Co-located Engineering teams	Distributed Engineering teams	53.1%	L	1	3
ATPI3-8	High focus on revenue and sales	Low focus on revenue or sales	90.6%	H	1	2
ATPI3-9	Team was motivated & engaged	Team was not motivated or engaged	93.8%	H	1	2
ATPI4-1	Had clear business problems to be solved	Open scope, no boundaries, business problem too broad	81.3%	H	3	1
ATPI4-10	Had executive sponsorship	Did not have executive sponsorship	65.6%	L	2	4
ATPI4-11	Well defined success outcomes	Did not have clear definition of success	84.4%	H	2	1
ATPI4-2	Requirements driven by customer validation	Requirements are not driven by customer validation	84.4%	H	1	2
ATPI4-3	Iterated on a released product	Shipped and didn't iterate	71.9%	L	1	4
ATPI4-4	Short development cycle (a quarter)	Long development cycle (over a year)	75.0%	I	3	2
ATPI4-5	Requirements scope has changed often	Minor alterations to scope	87.5%	H	4	5
ATPI4-6	Full usability into the usage data	No visibility into usage data	87.5%	H	1	1
ATPI4-7	Multiple indicators of usage	Few indicators of usage	87.5%	H	1	1
ATPI4-8	Success measured in terms of purchase	Success measured in terms of usage	65.6%	L	3	5
ATPI4-9	Diverse set of stakeholders aligned and partnered to achieve goals	Stakeholders were not aligned on mutual goals	87.5%	H	1	2
BSEX1-1	Was able to build a group from scratch	Inherited the group	75.0%	I	1	3
BSEX1-10	Market was not ready for the product	Market was ready for the product	75.0%	I	3	5
BSEX1-2	No community engagement	Community driven product	59.4%	L	5	5
BSEX1-3	Moving teams towards iterative development	Leaving the process alone	56.3%	L	1	2
BSEX1-4	Had a strong executive commitment	Marginal executive support	90.6%	H	1	1
BSEX1-5	Did not have a well-defined leading indicators	Well defined leading indicators to project success (work burndown)	81.3%	H	5	5
BSEX1-6	Good definition of done	No good definition of done	93.8%	H	1	1

BSEX1-7	Really clear product definition	No clear product definition	96.9%	H	1	1
BSEX1-8	Strong Product Manager engagement	No strong Product Management engagement	84.4%	H	1	1
BSEX1-9	Dedicated Project Manager	No dedicated project Manager	50.0%	L	1	1
BSPX11-1	Had several intended outcomes	Had one specific outcome	81.3%	H	3	5
BSPX11-10	Was a relatively small team	Required a large team	90.6%	H	1	1
BSPX11-11	Clearly defined outcomes	Unclear outcomes	75.0%	I	3	1
BSPX11-12	Well defined responsibilities for each member of the team	Responsibilities loosely defined or undefined	90.6%	H	1	1
BSPX11-13	A well-defined system that everyone is using regardless of a particular methodology	No well-defined system to follow	75.0%	I	3	1
BSPX11-14	Dedicated resources	No dedicated resources - split attention (allocating 25% to one thing and 25% to another)	68.8%	I	4	2
BSPX11-15	Dependencies and contingencies were not fully understood in advance	Dependencies and contingencies were fully understood in advance	78.1%	I	3	5
BSPX11-2	Required market understanding	Required technical understanding	59.4%	L	1	4
BSPX11-3	Fell into a single product line in terms of teams working on it	Fell into multiple product lines	71.9%	I	3	1
BSPX11-4	Had to focus on customers	Had many internal stakeholders	71.9%	I	3	3
BSPX11-5	Followed Agile methodology	No meaningful methodology followed	71.9%	I	1	1
BSPX11-6	Required exec sponsorship	Did not require exec sponsorship	71.9%	I	1	5
BSPX11-7	Required infrastructure changes	Did not require infrastructure changes	62.5%	L	3	5
BSPX11-8	Required UX design	Did not require UX design	56.3%	L	4	2
BSPX11-9	Driven by customer requirements	Driven by product leadership	68.8%	I	3	1

BSPX12-1	Solving high impact and high urgency (time to market) problems for the business	The problem was not as urgent or as impactful	93.8%	H	1	1
BSPX12-10	A robust tracking methodology for success (clear definition of success, and a way to track and measure it)	Poor definition of success, inability to track and measure	90.6%	H	1	1
BSPX12-2	Executive acknowledgement of the need and a buy in for a solution and the relative priority	Only some aspects had buy in, but not all (the need, the solution, the priority)	81.3%	I	1	2
BSPX12-3	Were not grounded in a market need, included many untested assumptions	Thoroughly understood the market need	90.6%	H	5	5
BSPX12-4	Could be executed in a single organization	Was executed in a cross-functional manner	62.5%	L	1	1
BSPX12-5	Aiming at building a market position created by a new innovative technology trend	The technology was not really innovative, even if it was new	71.9%	L	1	3
BSPX12-6	Executing what customers ask for	Extrapolating what the customers will ask for (anticipating the customers' needs)	65.6%	L	3	1
BSPX12-7	Ability to reach the market and activate a Sales force and partners	Inability to reach the market and activate a Sales force and partners (due to lack of funds, capabilities in Sales or Marketing)	78.1%	I	1	1
BSPX12-8	Clarity inside the org around the product vision (who is the buyer, what is the problem, etc)	Lack of vision clarity / understanding	75.0%	I	1	1
BSPX12-9	Clarity of roles and responsibilities	Lack of clarity of roles and responsibilities	84.4%	H	1	1
BSPX4-1	Self-contained within the company	Had dependency on external stakeholders	71.9%	I	4	1
BSPX4-10	Strong executive sponsorship	No exec sponsorship	71.9%	I	1	2
BSPX4-11	Aligned with existing routes to market	No alignment with existing routes to market	87.5%	H	1	2
BSPX4-12	Defining a clear market opportunity with differentiation in mind	No clear opportunity or differentiation defined	71.9%	I	1	2
BSPX4-2	Large portfolio products	Stand-alone product	62.5%	L	5	5

BSPX4-3	Required large number of stakeholders (product owners)	Fewer stakeholders involved	68.8%	L	5	5
BSPX4-4	Thorough market analysis was done	No market analysis	71.9%	I	2	4
BSPX4-5	Frequent feedback loop with stakeholders internal and external	No incremental feedback with stakeholders	81.3%	H	1	1
BSPX4-6	Close community (developers, users) collaboration	No community collaboration	71.9%	I	3	2
BSPX4-7	Well defined business objectives	Loosely defined business objectives	62.5%	L	1	3
BSPX4-8	Well defined the window of opportunity	Window of opportunity is unclear	75.0%	I	1	1
BSPX4-9	Alignment with strategic goals	No alignment with strategic goals	90.6%	H	1	1
BSEX8-1	Followed more agile approaches	Followed more waterfall approaches	68.8%	L	3	1
BSEX8-10	Had thought leadership and expertise in a vertical	No expertise in a vertical	81.3%	I	1	1
BSEX8-11	Organizational leadership: ability to build a team that works well together	Weak organizational leadership	81.3%	I	1	1
BSEX8-12	Having a perception of being a leader in the market (external perspective)	Not being seen as a leader in the market	81.3%	I	1	1
BSEX8-2	Unity of command, one goal, one person in charge of that goal	Diffused command - multiple people, multiple goals	84.4%	H	2	1
BSEX8-3	Organically run by experts in teams themselves	A lot of cooks in the kitchen	90.6%	H	1	1
BSEX8-4	A deep technological and market expertise	Not a lot of depth of product specific knowledge with respect to tech and market	75.0%	L	4	1
BSEX8-5	Well established, known market spaces	A completely new market	68.8%	L	3	3
BSEX8-6	Had a singular deliverable, singular goal	Objective was to solve goals of different constituents	81.3%	I	1	1
BSEX8-7	Solved only one technical problem	Needed to solve a myriad of technical problems	87.5%	H	1	1
BSEX8-8	Had clear objectives and clear leadership	Lack of solid objectives and good leadership	87.5%	H	1	1

BSEX8-9	Had metrics that incentivized the desired behaviour	Metrics that incentivized bad outcomes, bad behaviour	78.1%	I	3	1
BTEI7-1	New Business Opportunity, new market	Rethink, reimplement existing product	62.5%	L	1	3
BTEI7-10	Lowest level engineers knew the short term goals and were empowered to make decisions	Engineers were not able to make decisions due to lack of empowerment or knowledge	87.5%	H	1	1
BTEI7-11	Quality Engineering was embedded with the team from the beginning	Quality Engineering team started after Engineering work was done	75.0%	I	1	2
BTEI7-12	Quick iterations of delivery to the end-user	Slow iterations of delivery to the end user	75.0%	I	1	2
BTEI7-13	Dedicated, focused team	Team had other areas of responsibility (maintenance, legacy)	71.9%	I	1	3
BTEI7-14	Practiced code ownership (specialization)	Did not practice code ownership (generalization)	75.0%	I	2	4
BTEI7-2	Cross-department, within org boundaries	A spinoff out of the core org structure	68.8%	L	5	2
BTEI7-3	Larger teams	Small team	62.5%	L	4	3
BTEI7-4	Focused on new personas	Focused on personas we knew well	78.1%	I	2	5
BTEI7-5	Project contributing to a larger program	A stand-alone program (project is the program)	65.6%	L	5	3
BTEI7-6	No community at all	Strong community participation	71.9%	I	5	5
BTEI7-7	Driven by Eng with no PM guidance	Had a strong PM support	62.5%	L	2	4
BTEI7-8	Quick increments, designing for next increment	Upfront design for the entire project	71.9%	I	2	2
BTEI7-9	Revenue-based success metrics	Did not focus on revenue as a metric	75.0%	I	4	2
BTEX2-1	Assigned smaller more concrete coding tasks	More elaborate project management and overall project strategy	75.0%	H	5	1
BTEX2-10	Starting out with well-defined milestones	Starting out with no or ill-defined milestones	81.3%	H	2	1
BTEX2-11	Coarse grained tracking (Epics, stories) with roadmaping tools like Aha!	Fine grained tracking (tasks) with tools like Jira	71.9%	I	2	5
BTEX2-12	Authority is required to direct the team	Influence other teams	68.8%	I	4	2

BTEX2-2	Cross Team collaboration and coordination	Personnel management within a single team	59.4%	L	1	5
BTEX2-3	Minimize time and effort spent	Achieve feature milestones	59.4%	L	5	1
BTEX2-4	Improving quality and usability, minimizing defects and Support escalations	Optimizing ongoing operations	75.0%	H	3	1
BTEX2-5	Assigned to the team	Assigned to myself	71.9%	I	2	3
BTEX2-6	Had deadlines	Did not have deadlines	65.6%	L	3	3
BTEX2-7	Easily trackable metrics (bug reports)	Have not been able to define good metrics yet	75.0%	H	3	1
BTEX2-8	Customer expectation is for issues and new features to be addressed on a quarterly cadence	Customer's expectation is for ongoing delivery of fixes and new features (SaaS)	59.4%	L	3	5
BTEX2-9	One way feedback from customer on a quarter delay	Fast feedback loop responding to customer	81.3%	H	5	4
BTEX3-1	Agile methodology used for development	More traditional / waterfall methodology	90.6%	H	1	2
BTEX3-10	Success was clearly defined and agreed by all stakeholders	Different stakeholders had different outcomes in mind (wasn't agreement what was the most important factor for success)	71.9%	I	2	1
BTEX3-11	Had a stable project leadership team	Had churn in project leadership throughout the project	68.8%	L	1	2
BTEX3-12	Teams had longevity before the project started	Teams were newly formed around the project	68.8%	L	2	3
BTEX3-2	Responses to existing customer requests	Due to prospect or potential customer request	68.8%	L	4	2
BTEX3-3	Requirements were driven by market analysis	Requirements were fairly specific	65.6%	L	2	4
BTEX3-4	Small number of large customers (Enterprise)	Had large number of small customers (SMB)	65.6%	L	2	4
BTEX3-5	Requirements driven by Product Managers	Requirements driven by the field organization	62.5%	L	4	2
BTEX3-6	Technology was evolving incrementally	New technology foundation was required	68.8%	L	4	2

BTEX3-7	Had to integrate with the wider product portfolio	Individual/standalone product	68.8%	L	2	4
BTEX3-8	A single Eng Mgr responsible for the project	Multiple Eng Mgrs responsible for the project	78.1%	I	2	4
BTEX3-9	Roadmap was well defined	Vision was well defined	75.0%	I	4	2
BTEX9-1	A very long exploration phase	A short exploration phase	68.8%	L	2	3
BTEX9-10	Had a shared vision of what we are trying to accomplish	Did not have a shared vision	84.4%	H	1	1
BTEX9-11	Had executive buy in	Did not have executive buy in	87.5%	H	1	2
BTEX9-12	Teams with a complete skill set (had skill diversity)	Homogenic skills, no diversity	87.5%	H	1	1
BTEX9-13	Several smaller deliverables with milestones	One large deliverable at the end	71.9%	I	2	2
BTEX9-2	Low to no funding	Significant funding allocated	65.6%	L	3	3
BTEX9-3	Had very little oversight in the first 1-2 years	Moderate to higher level of oversight (program management, cross-functional)	71.9%	I	2	4
BTEX9-4	Outside market influences with respect to tech to be used for the project	Largely internally focused with respect to tech to be used	75.0%	I	2	2
BTEX9-5	Existing dependencies that required more coordination over deliverables that we didn't have a direct control over	More self-contained, less dependencies	65.6%	L	3	4
BTEX9-6	Had a newly developed specific Go To Market strategy	Leveraged the existing go to market	59.4%	L	2	4
BTEX9-7	Small to medium number of people involved (tens)	Large number of people involved (hundreds)	68.8%	L	4	3
BTEX9-8	Strategic alignment led to success	Strategic misalignment led to failure of a project	90.6%	H	2	1
BTEX9-9	Had a strong champion to drive the project forward, involved in day to day	Did not have a strong champion	81.3%	H	1	1
BTPI10-1	Harder to make changes on the fly due to large amount of communication	Easier to make changes on the fly	65.6%	I	5	3

BTPI10-2	Multiple teams, a lot of cross group coordination	Small focused group, little coordination	62.5%	L	4	3
BTPI10-3	Tasks were delegated as far down as possible (to domain experts). Was more agile in a way.	More "command and control" style	62.5%	L	1	3
BTPI10-4	Released very infrequently without a set cadence (once a year or less)	Released more frequently on a set schedule (twice year)	71.9%	H	5	3
BTPI10-5	Empowered team members	Micromanaged team members	62.5%	L	2	2
BTPI10-6	Narrow scope	Broad, vague scope	56.3%	L	2	3
BTPI10-7	Clearly communicated mission	Unclear mission	78.1%	H	2	1
BTPI10-8	Had a good understanding of the target market	Did not have a good understanding of target market	78.1%	H	2	1
BTPI10-9	Had a good go to market plan and execution	Poor go to market plan and execution	71.9%	H	1	1
BTPI6-1	Driven by clear user need	Driven by an anticipated opportunity	81.3%	H	1	1
BTPI6-10	Right compensation and incentives for the team	Underpaid, no rewards for success	87.5%	H	2	1
BTPI6-11	The technical challenges were interesting	Few technical challenges	71.9%	L	1	5
BTPI6-2	The target user was well known	The context for the product use was less known	75.0%	I	1	1
BTPI6-3	Driven by clear product metrics (cost of the product, performance)	Driven by value to the customer	65.6%	L	5	1
BTPI6-4	High budget, longer schedules	Limited time and resources	71.9%	L	1	4
BTPI6-5	Had clear goals about project outcome, definition of success	Did not have clear goals or definition of success	81.3%	H	3	1
BTPI6-6	Appropriate resources (right skills, adequate number of resources)	Resources not appropriate for the project	81.3%	H	1	1
BTPI6-7	Strong executive commitment	Weak or no exec commitment	78.1%	I	2	1
BTPI6-8	Organizational alignment	No organizational alignment	78.1%	I	1	1

BTPI6-9	Team motivated to drive project to successful outcome	Unmotivated, burnt-out team members	87.5%	H	1	2
BTPX5-1	A project was for a market with a clear leader	A project was for a market with no established leader	65.6%	L	5	2
BTPX5-10	Had core competencies required for development	Did not have core competencies required for development	81.3%	H	2	1
BTPX5-11	Had ability to execute on the vision	Did not have an ability to execute on the vision	75.0%	H	1	3
BTPX5-2	Partner-led with defined market opportunities	Partners are asking for help to establish a position in an existing market	65.6%	L	1	2
BTPX5-3	Driven using Agile methodologies	More driven by Waterfall-like methodologies	68.8%	I	1	2
BTPX5-4	Proactive in defining the vision ahead of the market	Built-in exit strategy from the beginning	75.0%	H	1	2
BTPX5-5	Partner is a big part of strategy	A solo act without partner involvement	68.8%	I	2	2
BTPX5-6	Observe-Orient-Decide-Act Loop used in managing the project	Situation-Core Competencies-Obstacles-Prospects-Expectations approach was used	75.0%	H	1	2
BTPX5-7	Led by strong established vendors (partners)	Net new offering / new category, no competitors	62.5%	L	2	2
BTPX5-8	Clear definition of success	No clear definition of success	78.1%	H	1	1
BTPX5-9	Metrics are about mindshare and market share	Metrics are about market relevance, revenue opportunity	65.6%	L	1	5

Appendix 5 – Reliability Analysis - First Attempt

Researcher \ Collaborator	Well Resourced	Partner Engagement	Strategic Alignment	Executive Support	Project Leader / Hero Reliance	Clear Vision and Goals	Agile / Waterfall	Data Visibility	Clear Success Metrics	Customer Engagement / Empathy	Team motivation and incentives	Established Market Alignment	Dependencies	Technology Considerations	Risk Avoidance	Revenue Based Metrics	Team Structure & Organization	Misc	Team Size	Co-Located Resources	Ability to execute	Market Understanding & Expertize	Hard Deadlines	Scope	Validation Methods	Autonomy vs. Micro-Management	Stakeholder Considerations	Business Case / Model Considerations	Total
Funding	5																												5
Partner & Community Involvement		6																											6
Organisational Alignment			5	2													1							1			3		12
Executive Sponsorship				7	1								1																9
Leadership					2		1						1		1		2				1	1							9
Clarity of Vision						8				4		1	1									8						3	25
Methodologies		1					10							3			2	3								1			20
Data Driven Decision Making								6	1	2						1									1	1			12
Clarity of Objectives and Outcomes						13			7		1												2	1					24
Customer Feedback							2			3			1									1			2		1		10
Motivation & Incentives											5					2										2			9
Market Orientation												6										3							9
Dependency Management													9				1										1		11
Technology												1	1	7								1							10
Risk Reduction															9														9
Metrics								2	7						1	5	1				1		3						20
Team Skills & Structure					1								2	1			7		8	6	6			1					32
Misc	1		1		1							1	2	1			3	2						1		1			14
Scope Management							1										2												3
User Experience Focus							1					1	3												1				6
New Market Orientation												6						1							1			1	9
Delivery Cadence							10							1				1											12
Software Development Practices							2	1	1					4			1	1	1										11
Requirements Source					1					8				1		2	2					1				3		2	20
Total	6	7	6	9	6	21	27	9	16	17	6	16	21	18	11	10	22	8	9	6	8	15	5	4	5	8	5	6	**307**
Number of Agreements (Na)	5	6	5	7	2	8	10	6	7	3	5	6	9	7	9	5	7	2											**109**
Agreements due to chance (Nc)	0.1	0.1	0.2	0.3	0.2	1.7	1.8	0.4	1.3	0.6	0.2	0.5	0.8	0.6	0.3	0.7	2.3	0.4											**12.1**

% Agreement # agrements / # constructs in agreed categories

109 / 236 = **46.2%**

Appendix 6 – Reliability Analysis – Intermediate Categorisation

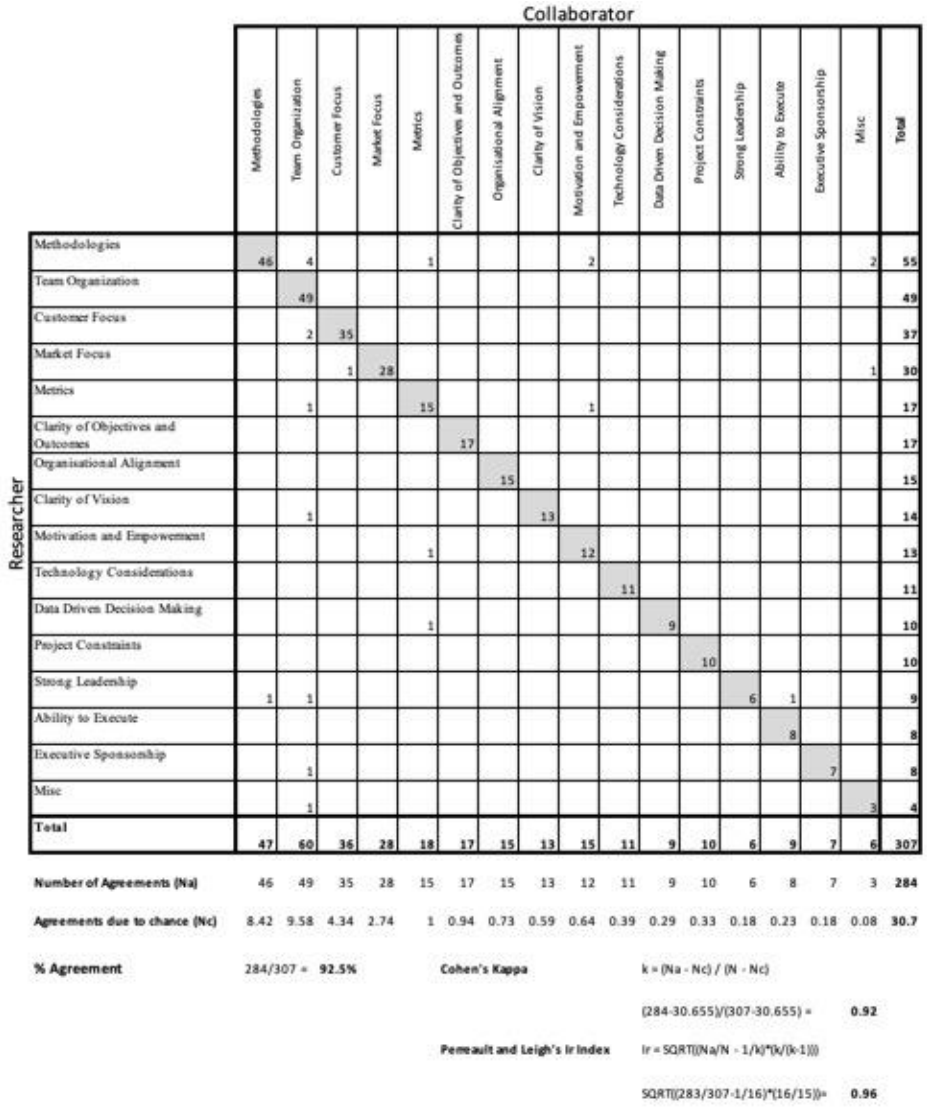
Collaborator

Researcher	Well Resourced	Partner Engagement	Customer Engagement /	Strategic Alignment	Stakeholder Considerations	Executive Support	Project Leader / Hero Reliance	Clear Vision	Outcomes and Goals	Agile / Waterfall	Data Visibility	Established Market Alignment	Team motivation and incentives	Team Structure & Organization	Team Size	Co-Located Resources	Ability to execute	Dependencies	Technology Considerations	Software Development	Risk Avoidance	Design Team Involvement	Market Understanding &	Validation Methods	Autonomy vs. Micro-Management	Hard Deadlines	Revenue Based Metrics	Clear Success Metrics	Business Case / Model	Misc	Total
Funding	5																														5
Partner & Community Involvement		6																													6
Customer Engagement			17											1				1													19
Organisational Alignment				6																											6
Stakeholder Considerations					9																										9
Executive Sponsorship						7												1													8
Leadership							6										1	1			1										9
Clarity of Vision								13										1													14
Clarity of Objectives and Outcomes									17																						17
Agile / Waterfall										29																				1	30
Data Driven Decision Making											9																	1			10
Market Alignment												14																	1	1	16
Motivation & Incentives													7													1					8
Team Organization														22																	22
Team Size															8																8
Co-Location																6															6
Ability to execute																	8														8
Dependency Management																		10													10
Technology Considerations																			11												11
Software Development Practices														1	1					6								1		1	10
Risk Reduction																					10										10
User Experience Design Team Involvement																						3									3
Market Understanding & Expertize																							14								14
Validation Methods																								5							5
Empowerment																									5						5
Schedule Conciderations																										5					5
Metrics focused on Revenue																											8				8
Clarity of Metrics														1										1				7			9
Business Case / Model Considerations																													7		7
Misc														1																3	4
Scope Management										1				2										2							5
Total	5	6	17	6	9	7	6	13	17	30	9	14	7	28	9	6	9	14	11	6	11	3	14	5	8	5	9	9	8	6	307
Number of Agreements (Na)	5	6	17	6	9	7	6	13	17	29	9	14	7	22	8	6	8	10	11	6	10	3	14	5	5	5	8	7	7	3	283
Agreements due to chance (Nc)	0.0814	0.1173	1.0521	0.1173	0.2638	0.1824	0.1759	0.5928	0.9414	2.9316	0.2932	0.7296	0.1824	2.0065	0.2345	0.1173	0.2345	0.456	0.3941	0.1954	0.3583	0.0293	0.6384	0.0814	0.1303	0.0814	0.2345	0.2638	0.1824	0.0782	13.4

% Agreement # agements / # constructs in agreed categories

283/302 = **93.7%**

Appendix 7 – Reliability Analysis – Definitive Categories



Researcher \ Collaborator	Methodologies	Team Organization	Customer Focus	Market Focus	Metrics	Clarity of Objectives and Outcomes	Organisational Alignment	Clarity of Vision	Motivation and Empowerment	Technology Considerations	Data Driven Decision Making	Project Constraints	Strong Leadership	Ability to Execute	Executive Sponsorship	Misc	Total
Methodologies	46	4			1				2							2	55
Team Organization		49															49
Customer Focus		2	35														37
Market Focus			1	28												1	30
Metrics		1			15				1								17
Clarity of Objectives and Outcomes						17											17
Organisational Alignment							15										15
Clarity of Vision		1						13									14
Motivation and Empowerment					1				12								13
Technology Considerations										11							11
Data Driven Decision Making					1						9						10
Project Constraints												10					10
Strong Leadership	1	1											6	1			9
Ability to Execute														8			8
Executive Sponsorship		1													7		8
Misc		1														3	4
Total	**47**	**60**	**36**	**28**	**18**	**17**	**15**	**13**	**15**	**11**	**9**	**10**	**6**	**9**	**7**	**6**	**307**

Number of Agreements (Na)	46	49	35	28	15	17	15	13	12	11	9	10	6	8	7	3	**284**
Agreements due to chance (Nc)	8.42	9.58	4.34	2.74	1	0.94	0.73	0.59	0.64	0.39	0.29	0.33	0.18	0.23	0.18	0.08	**30.7**

% Agreement 284/307 = **92.5%**

Cohen's Kappa k = (Na - Nc) / (N - Nc)

(284-30.655)/(307-30.655) = **0.92**

Pemeault and Leigh's Ir Index Ir = SQRT((Na/N - 1/k)*(k/(k-1)))

SQRT((283/307-1/16)*(16/15))= **0.96**

Appendix 8 – Definitive Categories

			All Constructs		High Importance Constructs	
Definitive Category	**Intermediate Categories**	**Includes**	**Construct Number**	**Frequency**	**Construct Number**	**Frequency**
Methodologies	Agile / Waterfall Risk Reduction Software Development Practices Scope Management	Considerations about the software development methodology used for project execution (Agile vs. Waterfall), cadence of releases, response to change, risk reduction methods, and modern software development practices	ATEI13-6, BTEX3-1, ATPI3-6, ATEX1-6, ASEI8-12, ASPX9-5, ATEX1-8, ASPX9-2, ATEI13-4, ASEI8-2, ASPX5-16, ASPX2-12, ATPI11-14, ASEX6-12, ASPX9-11, BTPX5-6, BSPX11-13, ATPI4-4, BTEI7-12, ATPI4-3, BSPX11-5, BTEI7-8, BTEX9-13, BTPI10-4, BTPX5-3, BSEX8-1, ASEX7-13, ATEI12-2, BTEX2-8, BSEX1-3, ASPX5-15, ASEI8-14, ASPX10-3, BSPX11-15, ASPX5-1, ATEX1-1, ATPI11-5, ASEX6-7, ASPX9-7, BTEX2-3, ASPX10-2, BSEX1-6, BSEX8-3, ASEI8-1, ASEX6-13, ATEX1-11, BTEI7-14, BTEX2-4, BTEX2-1, ASPX9-8, ASEI8-5,	55 17.9%	ATEI13-6, BTEX3-1, ATPI3-6, ATEX1-6, ASEI8-12, ASPX9-5, ATEX1-8, ASPX9-2, ASPX5-16, ASPX2-12, ATPI11-14, ASPX9-11, BTPX5-6, BTPI10-4, ASPX5-15, ASEI8-14, ASPX10-2, BSEX1-6, BSEX8-3, ASEI8-1, ASEX6-13, BTEX2-4, BTEX2-1, ASEI8-5, ATPI4-5	25 8.1%

			ATPI4-5, ASPX2-8, ASPX2-9, ATEI12-4			
Team Organization	Team Organization Team Size Co-Location Dependency Management User Experience Design Team Involvement	Considerations about the team structure and organization around a project, team size, co-location, and dependencies on other teams	BSPX11-12, ATEX1-10, BSEX1-8, ASPX5-10, BSPX12-9, BSEX8-11, ATEX1-3, ASEX6-11, BTEI7-11, BSEX1-1, BTEX2-5, BSPX11-3, BTEX3-11, ASPX5-9, BTEI7-2, BTEX3-12, BSPX11-14, BTEI7-5, BTEI7-7, BSPX12-4, ATPI11-3, BSEX1-9, ASEX6-2, BSPX11-10, ASEX7-1, BTEX3-8, ATEX1-9, BTEI7-13, BTEX9-7, BTEI7-3, ATEI12-1, ASEI8-11, ASPX10-1, ASPX2-4, ATEX1-2, ATPI3-7, ASPX5-14, ATEI13-7, ASEI8-6, ASPX9-1, BSPX4-1, BTEX9-5, BTPI10-1, BTPI10-2, ASEX6-8, BTEX2-2, ASPX2-7, ATEI13-8, ASPX2-6	49 16.%	BSPX11-12, ATEX1-10, BSEX1-8, ASPX5-10, BSPX12-9, ASEX6-11, ASPX2-7, ASEX6-2, BSPX11-10, ASEX7-1, ATEI12-1, ASPX2-4, ASPX5-14, ATEI13-7, ASPX9-1	15 4.9%
Customer Focus	Customer Engagement Partner and Community Involvement Validation Methods	Factors involved in understanding the customer behavior, engaging with customers and	ATPI3-2, ASEX6-10, ATPI4-2, BTEX2-9, ASPX2-3, ASPX2-13, ASPX10-9, ASPX9-4, ASPX5-2, BSPX11-4,	37 12.1%	ATPI3-2, ASEX6-10, ATPI4-2, BTEX2-9, ASPX2-3,	7 2.3%

	Business Case / Model Considerations	partners, and whether these interactions drove the product direction	BSPX11-9, ASEI8-8, ATPI11-4, ATPI11-1, ATEI13-5, ATEI12-5, BTEX3-5, ATPI3-5, BSPX11-8, BTEI7-6, BSPX4-6, BTPX5-5, BTPX5-2, BTPX5-7, BSEX1-2, ASEI8-3, ASEX7-9, ASPX5-3, ATPI11-9, ASPX5-6, BTPI6-1, ATPI3-12, ATPI3-10, ASPX5-4, ATPI3-3, ASPX5-5, BTEX3-2		ASEX7-9, BTPI6-1	
Market Focus	Market Alignment Market Understanding and Expertise	The extent to which the leadership team of the project understands the market the product is being developed for; how well is the project aligned with the market needs, and with the go-to-market-motion	ATPI3-13, BSPX4-11, BSEX8-12, BTEI7-4, ATEI12-9, BSPX12-7, BSEX1-10, BTPX5-4, BTPI10-9, ASPX9-6, BSEX8-5, BTPX5-1, BTEI7-1, BTEX9-6, ASPX9-3, ASEX7-4, BSPX12-1, BSPX12-3, ASPX2-1, BSEX8-10, ASEX6-3, BTPI10-8, BSPX4-8, BTPI6-2, BSEX8-4, BSPX4-4, BTEX9-1, ATEI12-7, BTEX3-3, BSPX12-6	30 9.8%	ATPI3-13, BSPX4-11, ATEI12-9, BTPX5-4, BTPI10-9, BSPX12-1, BSPX12-3, ASPX2-1, BTPI10-8	9 2.9%
Metrics	Clarity of Metrics Metrics focused on	Presence of metrics, ability to track	BSPX12-10, ASPX5-7, ATEI12-11, ASEI8-9, ASEX7-10, ASPX5-	17 5.5%	BSPX12-10, ASPX5-7, ATEI12-11,	5 1.6%

	Revenue	success, revenue specific metrics	8, ATEI13-11, BTPX5-9, BTPI6-3, ATPI3-8, ASPX2-5, BTEI7-9, ATEI12-6, ATPI11-8, ATPI11-7, ASEI8-7, ATPI4-8		ASEX7-10, ATPI3-8	
Clarity of Objectives and Outcomes	Clarity of Objectives and Outcomes	Importance of having clear objectives and outcomes for the project	ASPX10-6, ASPX2-2, BSEX8-8, ASEI8-13, ATPI4-11, BTEX2-10, BSPX11-1, BSEX8-6, BSEX1-5, BTPI6-5, BTPX5-8, BSPX11-11, ASPX5-12, BTEX3-10, ATEI13-2, BSPX4-7, BTPI10-6	17 5.5%	ASPX2-2, BSEX8-8, ASEI8-13, ATPI4-11, BTEX2-10, BSPX11-1, BSEX1-5, BTPI6-5, BTPX5-8	9 2.9%
Organisational Alignment	Organizational Alignment Stakeholder Considerations	The extent to which the product in development is aligned with the rest of the organization and its strategy, had alignment and buy-in from external and internal stakeholders	BTEX9-8, BSPX4-9, ATPI3-11, ATPI11-10, BTPI6-8, BTEX3-7, ATPI4-9, ASEI8-15, ASPX5-13, BSPX4-5, ASPX10-5, ASPX9-9, ATPI11-13, ASPX2-11, BSPX4-3	15 4.9%	BTEX9-8, BSPX4-9, ATPI3-11, ATPI11-10, ATPI4-9, ASEI8-15, ASPX5-13, BSPX4-5, ASPX9-9, ATPI11-13	10 3.3%
Clarity of Vision	Clarity of Vision	How clear is the overall vision and strategic direction	BSEX1-7, ASPX10-7, ASPX9-10, BTEX9-10, ASPX5-11, ATPI4-1, BTPI10-7, ATEX1-4, ASEI8-16, ATPI11-12, BSPX12-8, BTEX3-9, BSPX4-12, BSPX11-2	14 4.6%	BSEX1-7, ASPX9-10, BTEX9-10, ASPX5-11, ATPI4-1, BTPI10-7, ATPI11-12	7 2.3%

Motivation and Empowerment	Motivation and Incentives Empowerment	The extent to which the teams were motivated, incentivized, and empowered to make decisions and execute on the project	ATPI3-9, BTPI6-9, ASPX10-8, BTPI6-10, ATPI3-14, BSEX8-9, ASPX10-10, ASEX6-9, BTEI7-10, BTEX9-3, ASEX7-11, BTPI10-3, BTPI10-5	13 4.2%	ATPI3-9, BTPI6-9, BTPI6-10, ATPI3-14, BTEI7-10	5 1.6%
Technology Considerations	Technology Considerations	Considerations about the technology and architecture of the product being developed	BSEX8-7, ASEX7-6, BTEX9-4, BTPI6-11, BSPX12-5, ASEX6-1, BTEX3-6, BSPX11-7, ASEX6-6, ATPI11-2, ASEX6-5	11 3.6%	BSEX8-7, ASEX7-6	2 .7%
Data Driven Decision Making	Data Driven Decision Making	Ability to track product health and usage and make decisions based on that data	ATPI3-1, ATPI4-6, ATPI4-7, ATEX1-5, ATEI13-9, ASEI8-4, ASPX10-11, ATEI13-10, BTEX2-7, ATPI11-6	10 3.3%	ATPI3-1, ATPI4-6, ATPI4-7, ATEX1-5, BTEX2-7	5 1.6%
Project Constraints	Funding Schedule Considerations	The extent to which the project had budget available and deadlines imposed.	ATPI3-4, ASEX7-7, BTPI6-4, BTEX9-2, ATEI12-10, ASEI8-10, ATPI11-11, ASEX7-2, ATEI12-3, BTEX2-6	10 3.3%	ATPI3-4, ATPI11-11, ASEX7-2	3 1.%
Strong Leadership	Strong Leadership	Importance of having strong leadership on the project. It may come from above or from within the team. Can be business or technical.	ASPX10-12, ASPX10-4, ATEX1-7, BSEX8-2, BTEX9-9, ASEX6-4, ASEX7-3, ASEX7-5, BTEX2-12	9 2.9%	ASPX10-12, ATEX1-7, BSEX8-2, BTEX9-9, ASEX6-4, ASEX7-3	6 2.%

Ability to Execute	Ability to Execute	How well is the team positioned to execute on the project, with respect to the skills, resources, maturity.	BTEX9-12, ASEX7-12, BTPX5-10, BTPI6-6, BTPX5-11, ATEI13-1, ATEI12-8, ATEI13-3	8 2.6%	BTEX9-12, ASEX7-12, BTPX5-10, BTPI6-6, BTPX5-11	5 1.6%
Executive Sponsorship	Executive Sponsorship	Importance of having an executive sponsor on the project	BSEX1-4, BTEX9-11, BSPX12-2, BTPI6-7, BSPX4-10, BSPX11-6, ATPI4-10, ASPX2-10	8 2.6%	BSEX1-4, BTEX9-11	2 .7%
Misc	Misc		BTEX2-11, BTEX3-4, BSPX4-2, ASEX7-8	4 1.3%		1 .3%

Appendix 9 – Differential Analysis

		Company		Level		Function		Experience	
Category	**Includes**	**Company A**	**Company B**	**Strategic**	**Tactical**	**Product**	**Engineering**	**Exploratory**	**Exploitative**
Methodologies	Considerations about the software development methodology used for project execution (Agile vs. Waterfall), cadence of releases, response to change, risk reduction methods, and modern software development practices	36 11.7%	19 6.2%	29 9.4%	26 8.5%	25 8.1%	30 9.8%	36 11.7%	19 6.2%

Team Organization	Considerations about the team structure and organization around a project, team size, co-location, and dependencies on other teams	23 7.5%	26 8.5%	25 8.1%	24 7.8%	19 6.2%	30 9.8%	34 11.1%	15 4.9%

Customer Focus	Factors involved in understanding the customer behaviour, engaging with customers and partners, and whether these interactions drove the product direction	24 7.8%	13 4.2%	18 5.9%	19 6.2%	26 8.5%	11 3.6%	22 7.2%	15 4.9%
Market Focus	The extent to which the leadership team of the project understands the market the product is being developed for; how well is the project aligned with the market needs, and with the go-to-market-motion	8 2.6%	22 7.2%	17 5.5%	13 4.2%	16 5.2%	14 4.6%	22 7.2%	8 2.6%

Metrics	Presence of metrics, ability to track usage and success, revenue specific metrics	13 4.2%	4 1.3%	7 2.3%	10 3.3%	10 3.3%	7 2.3%	6 2.%	11 3.6%
Clarity of Objectives and Outcomes	Importance of having clear objectives and outcomes for the project	6 2.%	11 3.6%	10 3.3%	7 2.3%	10 3.3%	7 2.3%	12 3.9%	5 1.6%
Organisational Alignment	The extent to which the product in development is aligned with the rest of the organization and its strategy, had alignment and buy-in from external and internal stakeholders	9 2.9%	6 2.%	8 2.6%	7 2.3%	12 3.9%	3 1.%	9 2.9%	6 2.%

Clarity of Vision	How clear is the overall vision and strategic direction	7 2.3%	7 2.3%	8 2.6%	6 2.%	9 2.9%	5 1.6%	10 3.3%	4 1.3%
Motivation and Empowerment	The extent to which the teams were motivated, incentivized, and empowered to make decisions and execute on the project	6 2.%	7 2.3%	5 1.6%	8 2.6%	8 2.6%	5 1.6%	6 2.%	7 2.3%
Technology Considerations	Considerations about the technology and architecture of the product being developed	5 1.6%	6 2.%	7 2.3%	4 1.3%	4 1.3%	7 2.3%	9 2.9%	2 .7%
Data Driven Decision Making	Ability to track product health and usage and make decisions based on that data	9 2.9%	1 .3%	2 .7%	8 2.6%	5 1.6%	5 1.6%	3 1.%	7 2.3%
Project Constraints	The extent to which the project had budget available and deadlines imposed.	7 2.3%	3 1.%	3 1.%	7 2.3%	3 1.0%	7 2.3%	4 1.3%	6 2.%

Strong Leadership	Importance of having strong leadership on the project. It may come from above or from within the team. Can be business or technical.	6 2.%	3 1.%	6 2.%	3 1.%	2 .7%	7 2.3%	9 2.9%	0 .%
Ability to Execute	How well is the team positioned to execute on the project, with respect to the skills, resources, maturity.	4 1.3%	4 1.3%	1 .3%	7 2.3%	3 1.0%	5 1.6%	4 1.3%	4 1.3%
Executive Sponsorship	Importance of having an executive sponsor on the project	2 .7%	6 2.%	5 1.6%	3 1.0%	6 2.0%	2 .7%	6 2.%	2 .7%
Misc		1 .3%	3 1.%	2 .7%	2 .7%	1 .3%	3 1.%	4 1.3%	0 .%

Appendix 10 – Differential Analysis – Statistical Significance

*indicates **z** significant at <0.05 and >0.01 level; ** indicates **z** significant at <= 0.01; figures in italics indicate significance at 90% confidence only.

	Company				Level				Function				Experience			
Combined Category	**A**	**B**	**z**	**p**	**Strategic**	**Tactical**	**z**	**p**	**Product**	**Engineering**	**z**	**p**	**Exploratory**	**Exploitative**	**z**	**p**
Methodologies	36	19	*1.87*	0.062	29	26	0.47	0.636	25	30	-1.04	0.299	36	19	0.27	0.784
Team Organization	23	26	-1.09	0.274	25	24	0.18	0.857	19	30	**-1.99***	0.047	34	15	0.88	0.378
Customer Focus	24	13	1.40	0.160	18	19	-0.15	0.877	26	11	**2.40***	0.016	22	15	-0.59	0.554
Market Focus	8	22	**-3.17****	0.002	17	13	0.79	0.431	16	14	0.18	0.859	22	8	1.14	0.255
Metrics	13	4	*1.91*	0.057	7	10	-0.73	0.462	10	7	0.60	0.551	6	11	**-2.52***	0.012
Clarity of Objectives and Outcomes	6	11	-1.60	0.110	10	7	0.76	0.446	10	7	0.60	0.551	12	5	0.60	0.551
Organisational Alignment	9	6	0.47	0.637	8	7	0.28	0.781	12	3	**2.24***	0.025	9	6	-0.32	0.751
Clarity of Vision	7	7	-0.31	0.754	8	6	0.56	0.576	9	5	0.96	0.338	10	4	0.60	0.545
Motivation and Empowerment	6	7	-0.59	0.558	5	8	-0.84	0.402	8	5	0.72	0.472	6	7	-1.36	0.175
Technology Considerations	5	6	-0.58	0.559	7	4	0.93	0.351	4	7	-1.04	0.297	9	2	1.26	0.206
Data Driven Decision Making	9	1	**2.32***	0.020	2	8	*-1.92*	0.055	5	5	-0.12	0.908	3	7	**-2.26***	0.024
Project Constraints	7	3	1.03	0.304	3	7	-1.28	0.202	3	7	-1.40	0.161	4	6	-1.60	0.111
Strong Leadership	6	3	0.77	0.442	6	3	1.02	0.305	2	7	*-1.80*	0.072	9	0	**2.29***	0.022
Ability to Execute	4	4	-0.23	0.815	1	7	**-2.14***	0.032	3	5	-0.82	0.412	4	4	-0.83	0.409
Executive Sponsorship	2	6	*-1.67*	0.095	5	3	0.73	0.468	6	2	1.33	0.183	6	2	0.67	0.506
Misc	1	3	-1.17	0.240	2	2	0.01	0.995	1	3	-1.08	0.280	4	0	1.51	0.130
Total	**166**	**141**			**153**	**154**			**159**	**148**			**196**	**111**		

Appendix 11 – Differential Analysis of Intermediate Categories – Statistical Significance

*indicates **z** significant at <0.05 and >0.01 level; ** indicates **z** significant at <= 0.01; figures in italics indicate significance at 90% confidence only.

	Company				Level				Function				Experience			
Category	**A**	**B**	**z**	**p**	**Strategic**	**Tactical**	**z**	**p**	**Product**	**Engineering**	**z**	**p**	**Exploratory**	**Exploitative**	**z**	**p**
Team Organization	6	16	**-2.62****	0.009	12	10	0.46	0.647	8	14	-1.50	0.133	17	5	1.36	0.174
Team Size	3	5	-0.95	0.341	3	5	-0.71	0.479	1	7	**-2.25***	0.024	6	2	0.67	0.506
Co-Location	6	0	**2.28***	0.023	3	3	0.01	0.994	3	3	-0.09	0.929	3	3	-0.71	0.476
Ability to execute	4	4	-0.23	0.815	1	7	**-2.14***	0.032	3	5	-0.82	0.412	4	4	-0.83	0.409
Dependency Management	5	5	-0.26	0.793	5	5	0.01	0.992	5	5	-0.12	0.908	6	4	-0.26	0.797
User Experience Design Team Involvement	3	0	1.60	0.109	2	1	0.59	0.558	2	1	0.52	0.604	2	1	0.10	0.919
Agile / Waterfall	18	12	0.69	0.493	13	17	-0.75	0.453	14	16	-0.59	0.554	18	12	-0.46	0.645
Risk Reduction	8	2	1.67	0.094	7	3	1.30	0.195	6	4	0.53	0.597	8	2	1.08	0.280
Scope Management	5	0	**2.08***	0.038	3	2	0.46	0.647	3	2	0.37	0.711	2	3	-1.12	0.263
Software Development Practices	5	5	-0.26	0.793	6	4	0.65	0.513	2	8	**-2.05***	0.041	8	2	1.08	0.280
Customer Engagement	14	5	1.77	0.077	10	9	0.25	0.801	13	6	1.50	0.134	11	8	-0.56	0.577
Partner & Community Involvement	0	6	**-2.68****	0.007	2	4	-0.82	0.414	4	2	0.74	0.461	5	1	1.00	0.316
Validation Methods	5	0	**2.08***	0.038	4	1	1.36	0.174	3	2	0.37	0.711	3	2	-0.18	0.857
Business Case / Model Considerations	5	2	0.93	0.351	2	5	-1.14	0.255	6	1	1.82	0.069	3	4	-1.17	0.242
Clarity of Vision	7	7	-0.31	0.754	8	6	0.56	0.576	9	5	0.96	0.338	10	4	0.60	0.545
Clarity of Objectives and Outcomes	6	11	-1.60	0.110	10	7	0.76	0.446	10	7	0.60	0.551	12	5	0.60	0.551

Market Alignment	5	11	-1.88	0.060	8	8	0.01	0.989	8	8	-0.15	0.883	11	5	0.42	0.675
Market Understanding & Expertise	3	11	**-2.51***	0.012	9	5	1.11	0.268	8	6	0.41	0.682	11	3	1.17	0.240
Clarity of Metrics	6	3	0.77	0.442	5	4	0.35	0.728	5	4	0.23	0.819	5	4	-0.53	0.599
Metrics focused on Revenue	7	1	1.92	0.055	2	6	-1.42	0.155	5	3	0.61	0.539	1	7	**-3.06****	0.002
Data Driven Decision Making	9	1	**2.32***	0.020	2	8	-1.92	0.055	5	5	-0.12	0.908	3	7	**-2.26***	0.024
Organisational Alignment	2	4	-1.03	0.303	1	5	-1.64	0.101	4	2	0.74	0.461	3	3	-0.71	0.476
Stakeholder Considerations	7	2	1.45	0.147	7	2	1.70	0.089	8	1	**2.26***	0.024	6	3	0.18	0.858
Motivation & Incentives	5	3	0.48	0.628	4	4	0.01	0.993	6	2	1.33	0.183	4	4	-0.83	0.409
Empowerment	1	4	-1.54	0.123	1	4	-1.35	0.179	2	3	-0.53	0.595	2	3	-1.12	0.263
Technology Considerations	5	6	-0.58	0.559	7	4	0.93	0.351	4	7	-1.04	0.297	9	2	1.26	0.206
Funding	3	2	0.27	0.789	1	4	-1.35	0.179	2	3	-0.53	0.595	2	3	-1.12	0.263
Schedule Considerations	4	1	1.17	0.241	2	3	-0.44	0.657	1	4	-1.43	0.151	2	3	-1.12	0.263
Strong Leadership	6	3	0.77	0.442	6	3	1.02	0.305	2	7	-1.80	0.072	9	0	**2.29***	0.022
Executive Sponsorship	2	6	-1.67	0.095	5	3	0.73	0.468	6	2	1.33	0.183	6	2	0.67	0.506
Misc	1	3	-1.17	0.240	2	2	0.01	0.995	1	3	-1.08	0.280	4	0	1.51	0.130
TOTAL	**166**	**141**			**153**	**154**			**159**	**148**			**196**	**111**		

Appendix 12 – Stage 2 Interview Guide

This is an excerpt from an 8-page interview guide used for stage 2 interviews. It demonstrates type of cards that were shown to interviewees.

1. **Finding #1: It appears that both strategic and tactical managers think about similar issues of importance when it comes to setting up a project for a successful outcome.**
   i. Card 2 – Differences between the levels

Category	Strategic	Tactical
Methodologies	29	26
Team Organization	25	24
Customer Focus	18	19
Market Focus	17	13
Metrics	7	10
Clarity of Objectives and Outcomes	10	7
Organisational Alignment	8	7
Clarity of Vision	8	6
Motivation and Empowerment	5	8
Technology Considerations	7	4
Data Driven Decision Making	2	8
Project Constraints	3	7
Strong Leadership	6	3
Ability to Execute	1	7
Executive Sponsorship	5	3
Misc	2	2
Total	**153**	**154**

So, from the table, we see that in most cases, both strategic and tactical managers agree on the issues of importance for setting a project to a successful outcome.

- Is this surprising?
- Does it get reflected in outcomes?
- What implications do you expect to see from this finding?

3. **Finding #3: It doesn't seem like managers leading exploratory innovation projects apply exploratory innovation-specific approaches.**
   i. **For example, I noticed was that people were using traditional revenue-based metrics– the sort you'd associate with incremental innovation projects– rather than customer and user traction-focused metrics.**
   ii. Card 3 – Metric-specific constructs

High focus on revenue and sales	Low focus on revenue or sales
Had no financial KPIs associated with outcomes	Clear financial metrics associated with outcomes
Revenue-based success metrics	Did not focus on revenue as a metric
Traditional metrics like revenue and active use were used to track success	**User engagement and user behavior metrics were used to track success**
High revenue goals for the first year after release	No revenue goals attached
Success measured in terms of purchase	**Success measured in terms of usage**

   iii. **Why do you think this might be the case (the fact that traction-focused metrics are not more prevalent in responses)?**
      1. Is that an issue?
      2. (If so), what might we be doing about it?

Appendix 13 – Preliminary Findings Report

This is an excerpt from a 12-page report shared with interviewees after the first stage of the study was completed.

1. Introduction

This document provides an early and high-level insight into findings from 25 interviews conducted across two participating companies. I'm planning to do a second round of interviews with a sub-set of participants to shed more light on these findings.

The objective of my research was to learn how managers at different levels, different functions, and different experiences think about exploratory innovation projects and incremental innovation projects. The focus was two-fold: identify the "issues of importance" and find out whether these were different between the two project types.

Why was that objective important, and why do I care as a practitioner? Well, we know several things from both the literature and practice:

1. Ambidexterity – ability to explore and exploit at the same time – is critical to a company's success in the market. Companies that are unable to explore and bring new products to market stagnate and become irrelevant.
2. Alignment is important throughout the hierarchy. If there is no alignment, then "agency" issues arise due to conflict of interests: managers at lower levels act in their own interest which may be different than the interest of more senior managers and as a result companies underperform.
3. Exploratory Innovation projects (development of new products, bringing existing products to new markets, leveraging technology in novel ways) come with significant uncertainty and risk around desirability, feasibility, and viability. These projects require different leadership styles, and different management approaches.

Note that this was a case study, focused on two companies that share many similar characteristics, and there was no intention to generalize to the population of managers across all the high-tech companies. That said, this approach does allow for generalization to companies with similar characteristics and in similar circumstances.

3. Emergent Findings

3.1. Alignment Throughout the Hierarchy

It appears that both strategic and tactical managers think about similar issues of importance when it comes to setting up a project for a successful outcome.

Table 3. Differences between the levels

Category	Strategic	Tactical
Methodologies	29	26
Team Organization	25	24
Customer Focus	18	19
Market Focus	17	13
Metrics	7	10
Clarity of Objectives and Outcomes	10	7
Organisational Alignment	8	7
Clarity of Vision	8	6
Motivation and Empowerment	5	8
Technology Considerations	7	4
Data Driven Decision Making	2	8
Project Constraints	3	7
Strong Leadership	6	3
Ability to Execute	1	7
Executive Sponsorship	5	3
Misc	2	2
Total	**153**	**154**

The only category with a statistically significant difference between the Strategic and Tactical sub-groups was "Ability to Execute".

This finding is extremely favourable to the two sample companies, indicating a high degree of alignment between managers throughout the hierarchy.

Appendix 14 – Detailed Findings Example from Stage 2

(Detailed records of interview summaries can be provided upon request)

Respondent	Focus Area 1: Alignment across levels	Focus Area 2: Differentiation between approaches used for the two types of innovation	Focus Area 3: Prominence of exploratory innovation-specific approaches	Focus Area 4: Experience as the leading indicator for differences in construing	Other Comments
ASPX-2 VP, Product Management	1. Surprising that data driven decision making not as important to strategic. Would expect it to be as equal or even more important as for tactical. Because strategic have to process large amounts of information, and you have to make strong data driven decisions. 2. Alignment between the levels is not surprising. 3. Org alignment: many times I've seen that tactical managers are not as focused on org alignment, so surprising to see the alignment on this. 4. Implications: just because you set up a project for success doesn't mean it will be successful. You have to ensure throughout the project that you pay attention to what is important for success.	1. Decisions on exploratory projects have a longer lasting impact, therefore technology considerations would be very different for an exploratory project. 2. There is a big difference in metrics. You want to make data driven decisions either way (so explains the low number of differences), while metrics need to be very different. 3. Interesting that clarity of vision is equal for both. Would expect to see a larger difference because on exploratory project the clarity of vision is so much more important, and a small deviation in a vision would have a bigger impact on exploratory project.	On Metrics: 1. Revenue is an easy metric to go after. In exploratory projects it's harder to develop good metrics, as sometimes you don't know what to measure, so you have to come up with a proxy to measure. That said, the leading indicators are way more important in exploratory projects. 2. As a product leader you need to have a hypothesis before you look at the data. It's easy to judge the health of the business by looking at the revenue. On Lean Startup: 1. People may know about the Lean Startup approaches, but it's easier to fall back to what you already know and just keep doing it. Very few people actually follow the Lean Startup in practice. 2. People are scared to get their hypotheses invalidated. 3. You should seek people who can invalidate your hypotheses and celebrate when you are wrong. If invalidation is early in a project, you just saved your project resources.	1. No surprises, the differences make sense. 2. Clarity of vision: having strong principles defined up front allows you to see the forest for the trees. This helps you to make decisions throughout the project.	(With respect to differences between Product and Engineering): 1. Org alignment: Engineering is more used to own the resources, whereas in PM you navigate the org. 2. Strong Leadership: interesting that there is a gap.

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